EXHIBIT 1

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United States Patent [19]

Farrell

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[45] Date of Patent: Sep. 8, 1998

[54] **APPARATUS AND METHOD FOR MAKING FROZEN DRINKS**

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[73] Assignee: **f'Real! Foods, LLC**, Orinda, Calif.

[21] Appl. No.: **794,859**

[22] Filed: **Feb. 5, 1997**

Related U.S. Application Data

[62] Division of Ser. No. 649,534, May 17, 1996.

[51] **Int. Cl.**[6] **B02C 19/12**

[52] **U.S. Cl.** **241/36**; 241/46.17; 241/199.12; 241/292.1

[58] **Field of Search** 241/33, 36, 38, 241/46.17, 57, 199.12, 292.1

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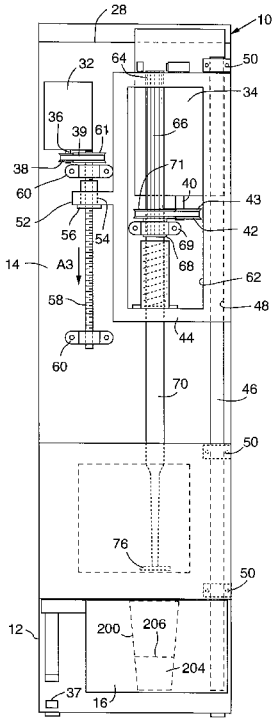
Primary Examiner—John M. Husar
Attorney, Agent, or Firm—Limbach & Limbach L.L.P.

[57] **ABSTRACT**

The present invention is a frozen drink machine and a method for making frozen drinks from a frozen substance which has been frozen into a cup. According to the method and the machine of the present invention, a cup containing a frozen substance is positioned in a cup support located in the frozen drink machine. A rotatable blade having features for grinding the frozen substance and for aerating the ground frozen substance is lowered into the cup, grinding the frozen substance while a liquid is simultaneously introduced into the cup. In an alternative embodiment, a second blade is provided which incorporates air into the liquid before the liquid is introduced into the cup.

27 Claims, 13 Drawing Sheets



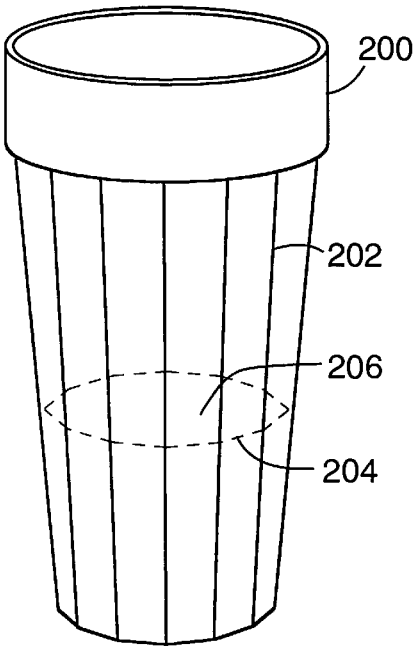
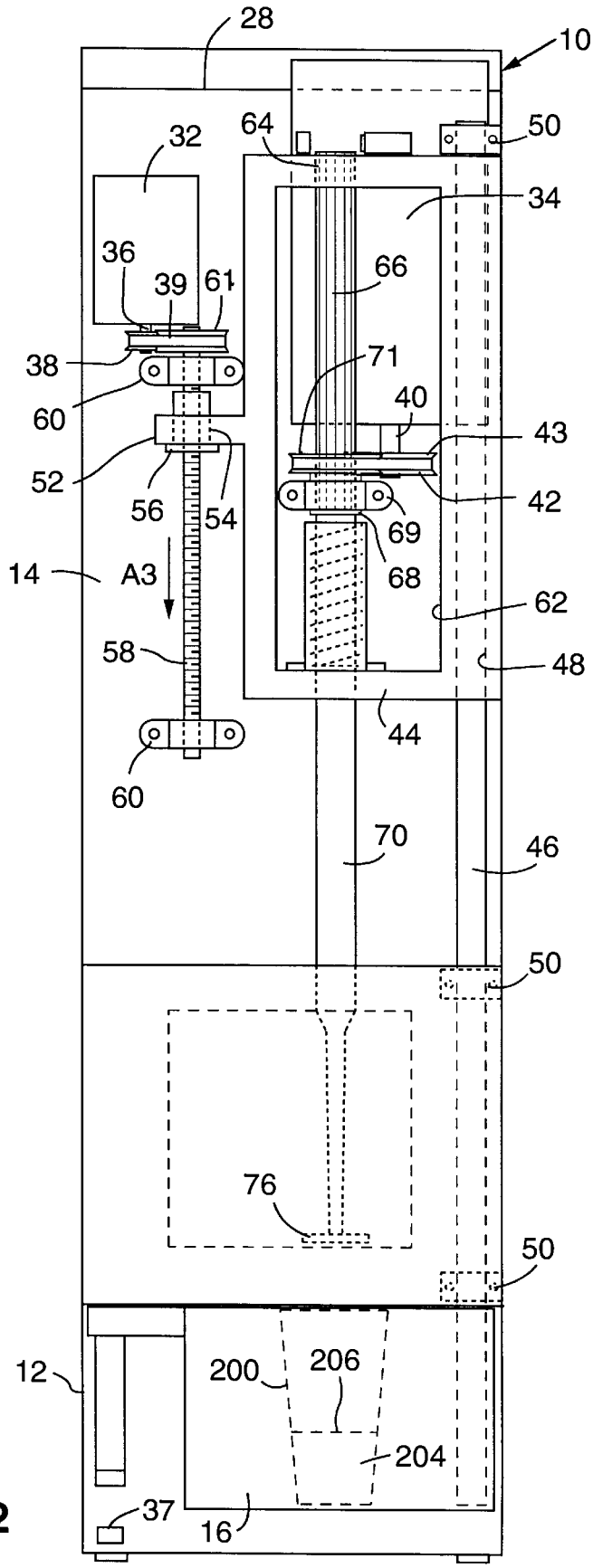

200
202
206
204

FIG. 1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10
32
64
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36
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42
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14
A3
68
62
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44
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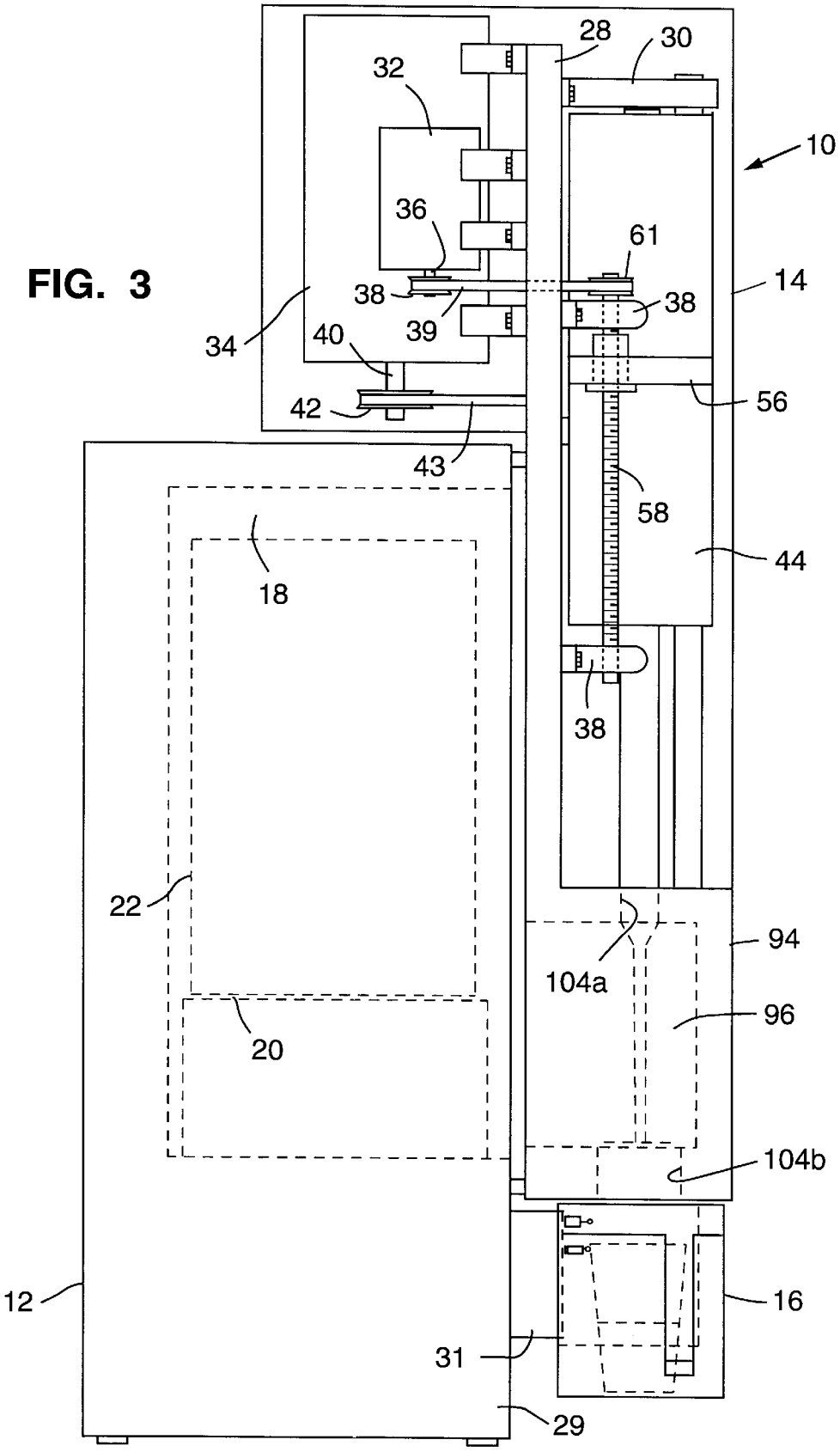
70
46
50
76
50
12
200
206
204
37
16

FIG. 2

FIG. 3


28
30
32
10
36
61
14
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38
34
40
39
56
42
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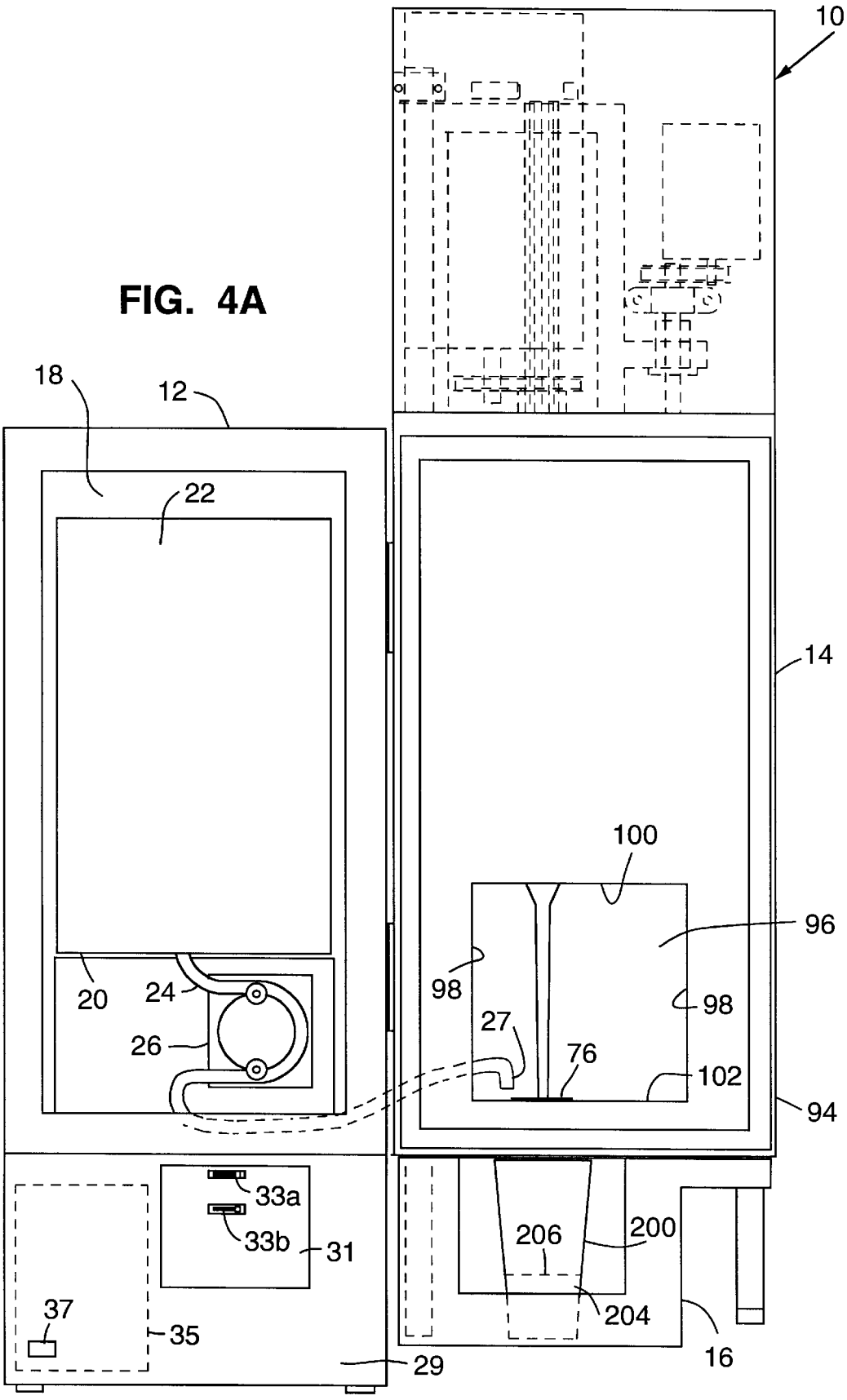
58
44
18
38
22
94
104a
96
20
104b
12
16
31
29

FIG. 4A


10
18
12
22
14
100
96
98
98
27
76
102
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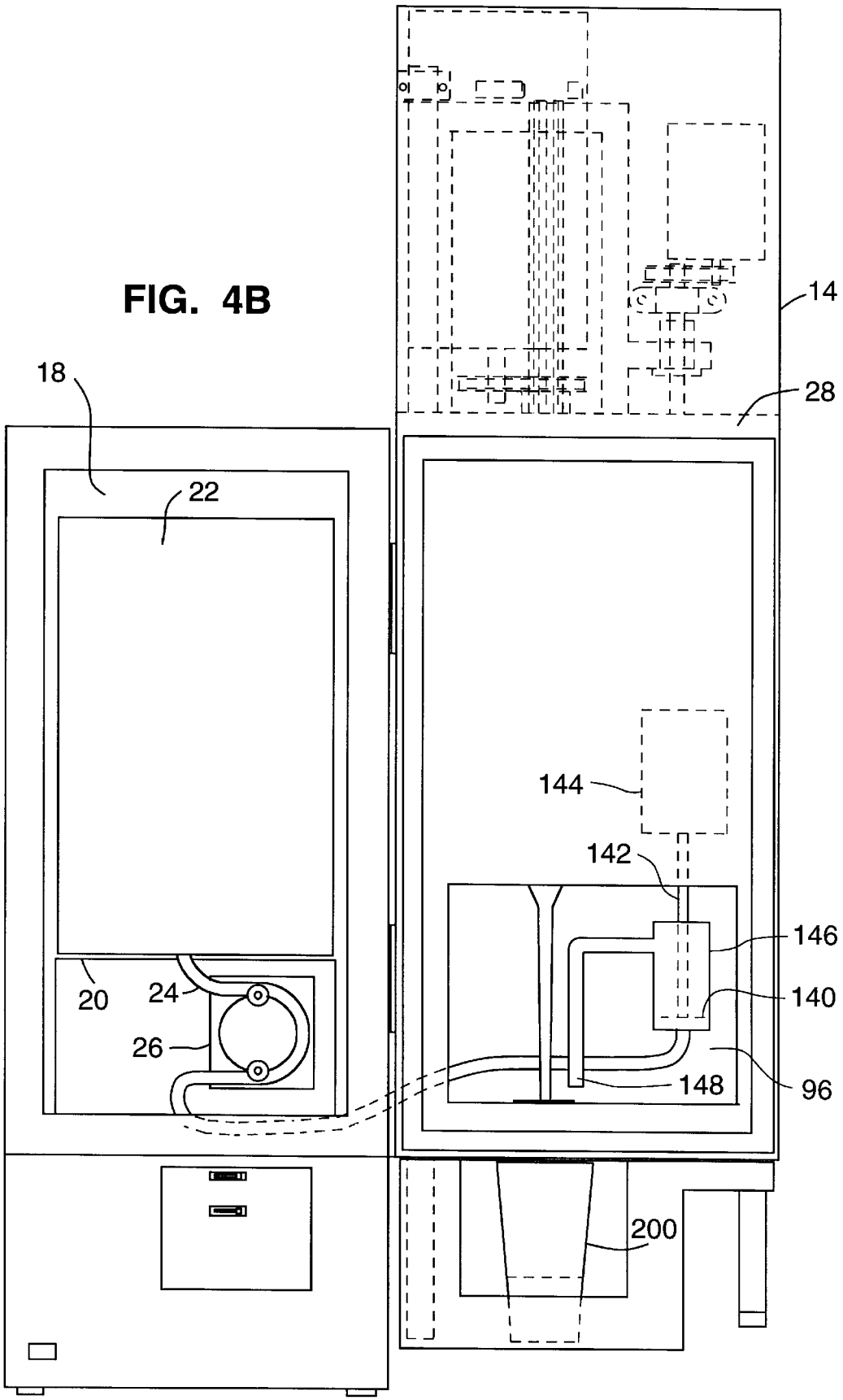
24
26
94
33a
33b
31
37
35
29
206
200
204
16

FIG. 4B



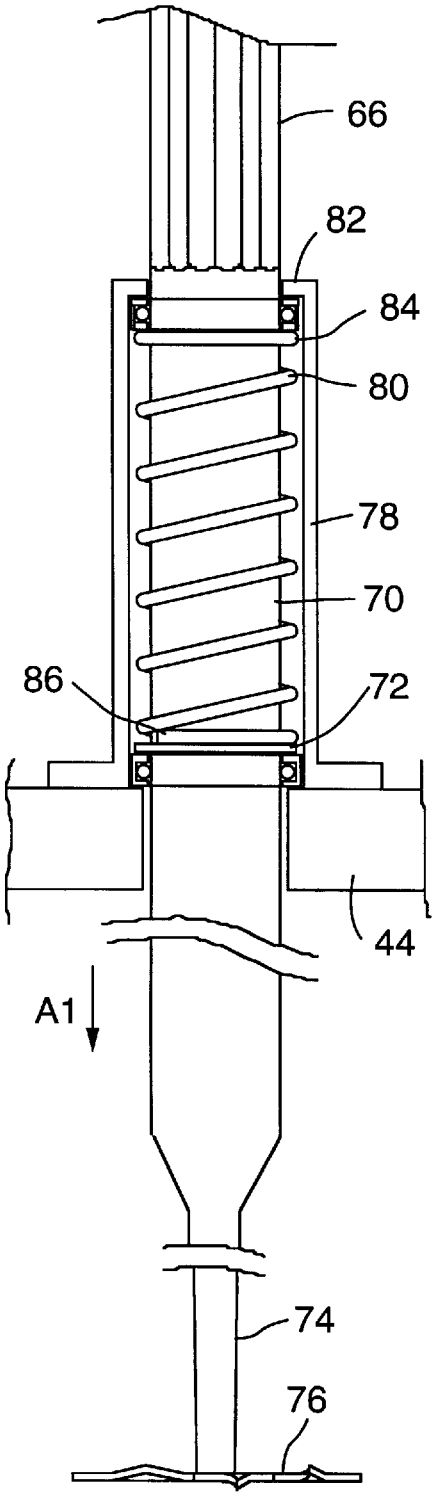


FIG. 5A

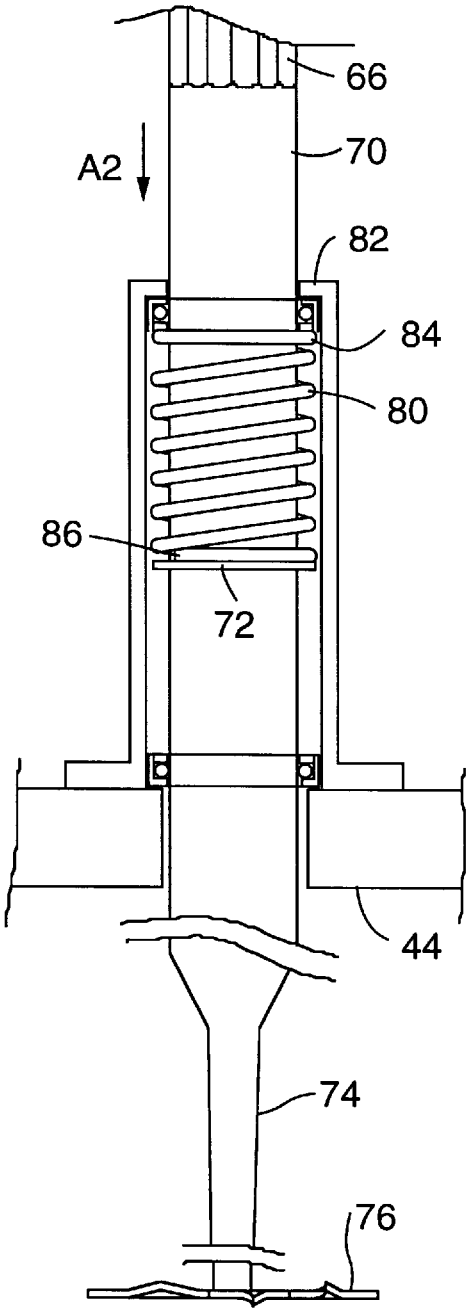


FIG. 5B

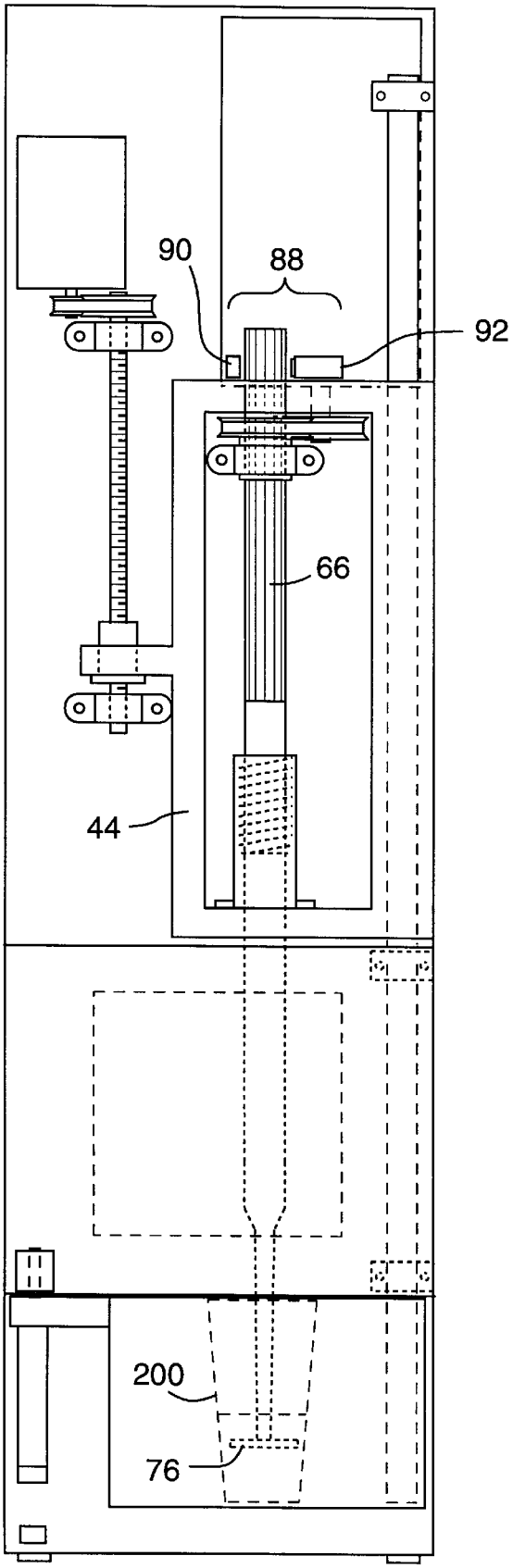


FIG. 6A

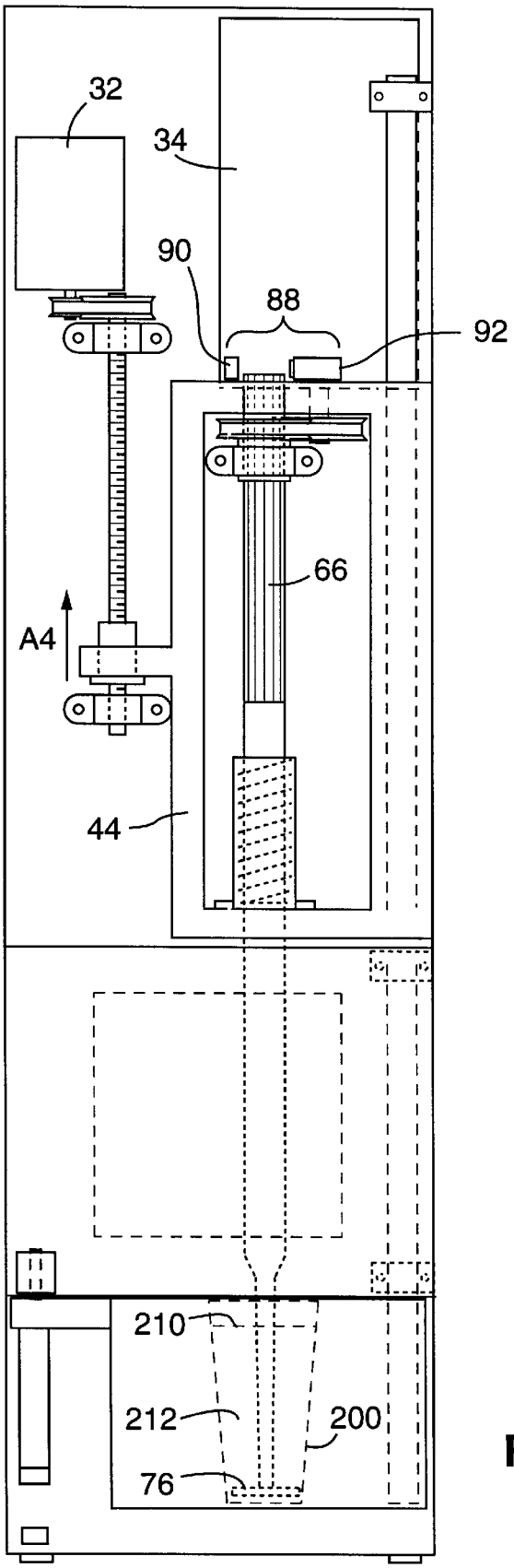


FIG. 6B

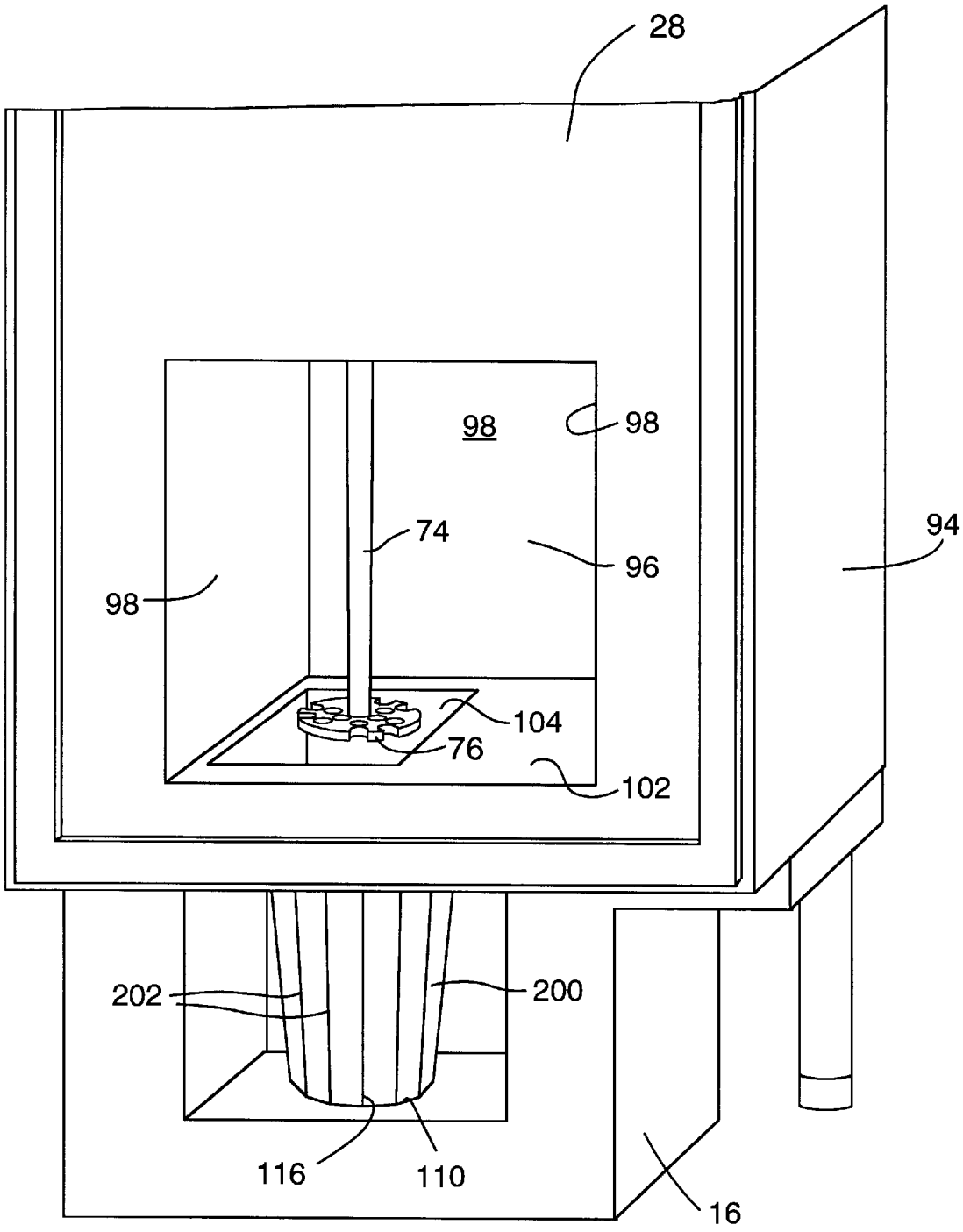


FIG. 7

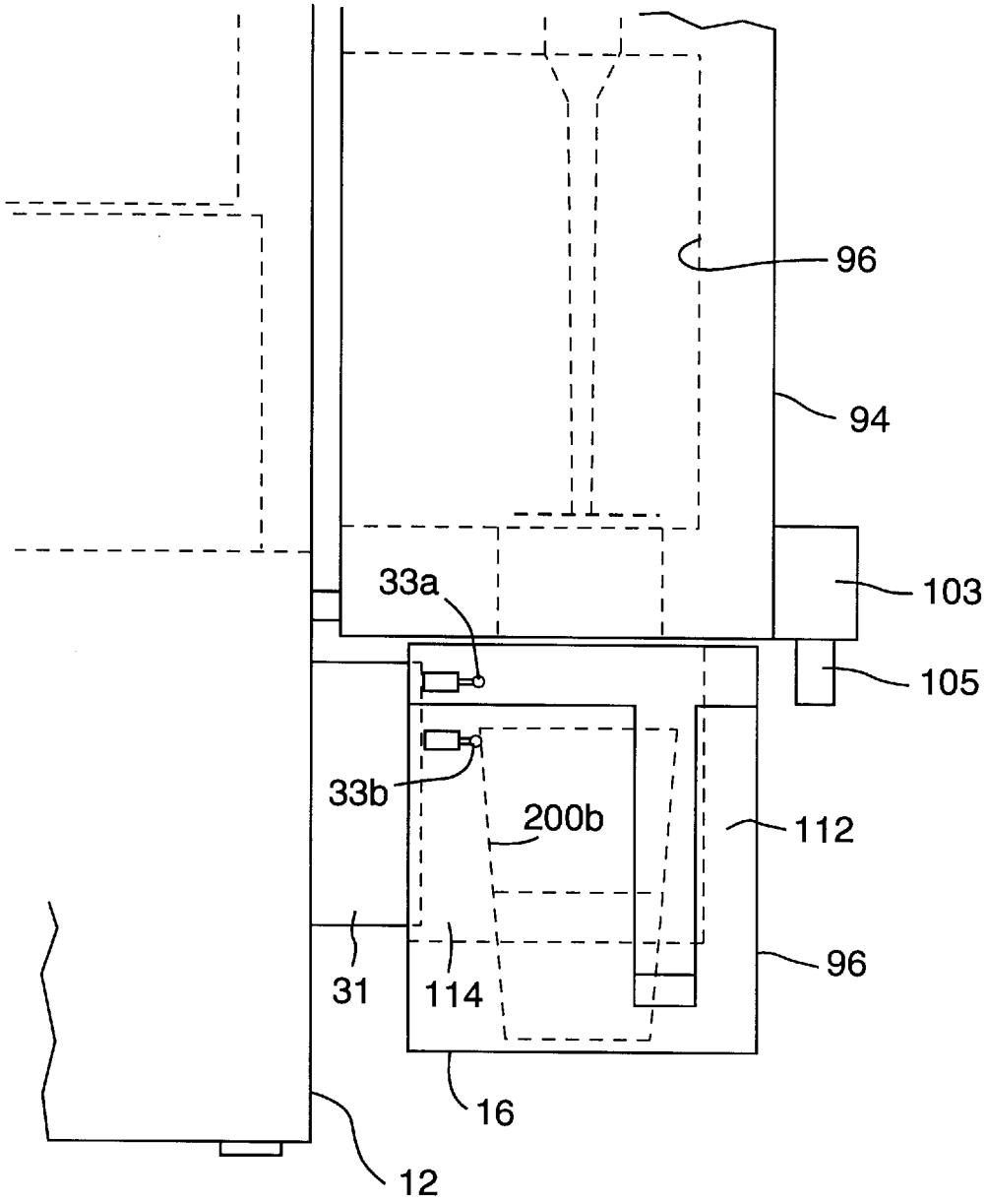


FIG. 8A

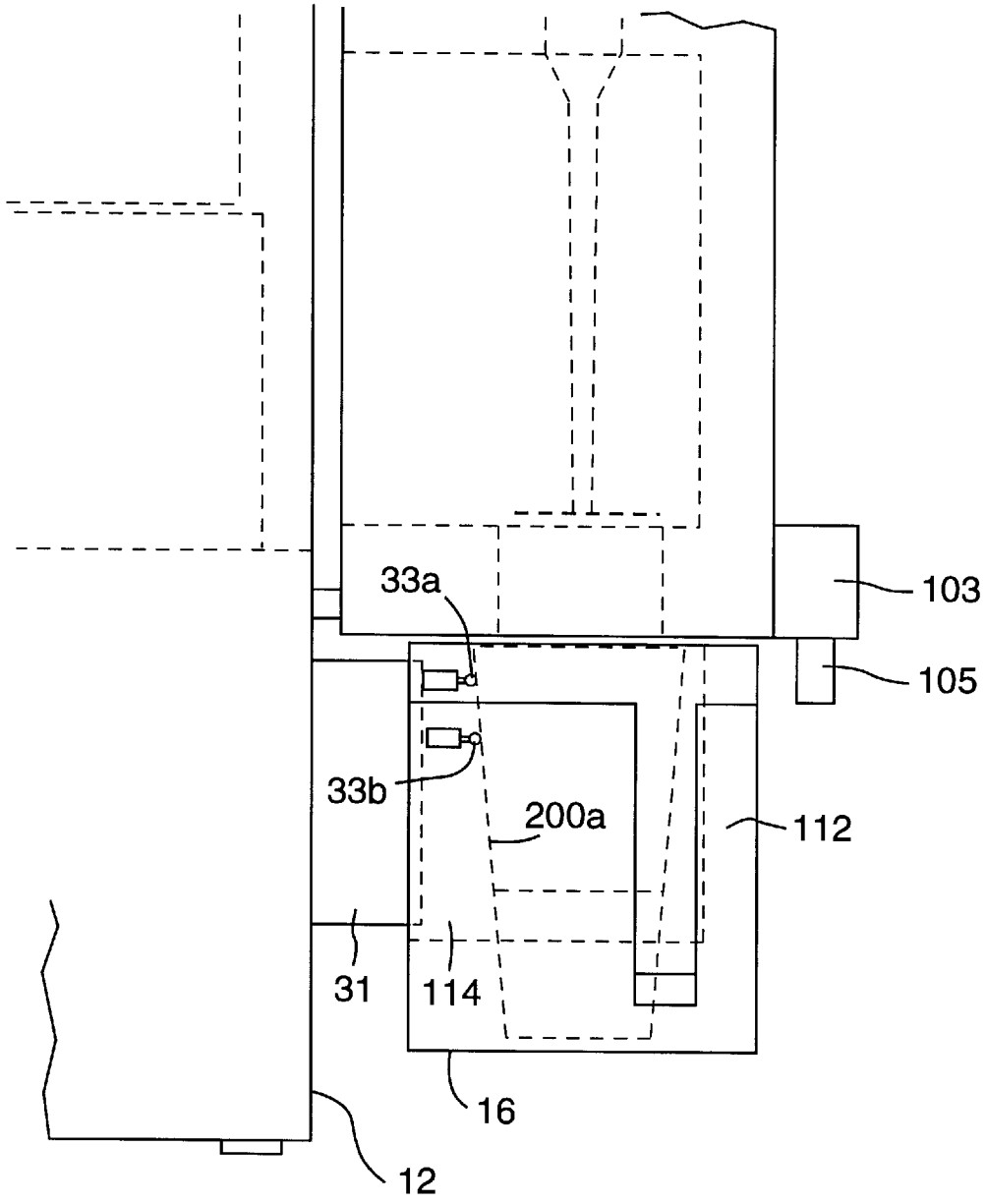


FIG. 8B

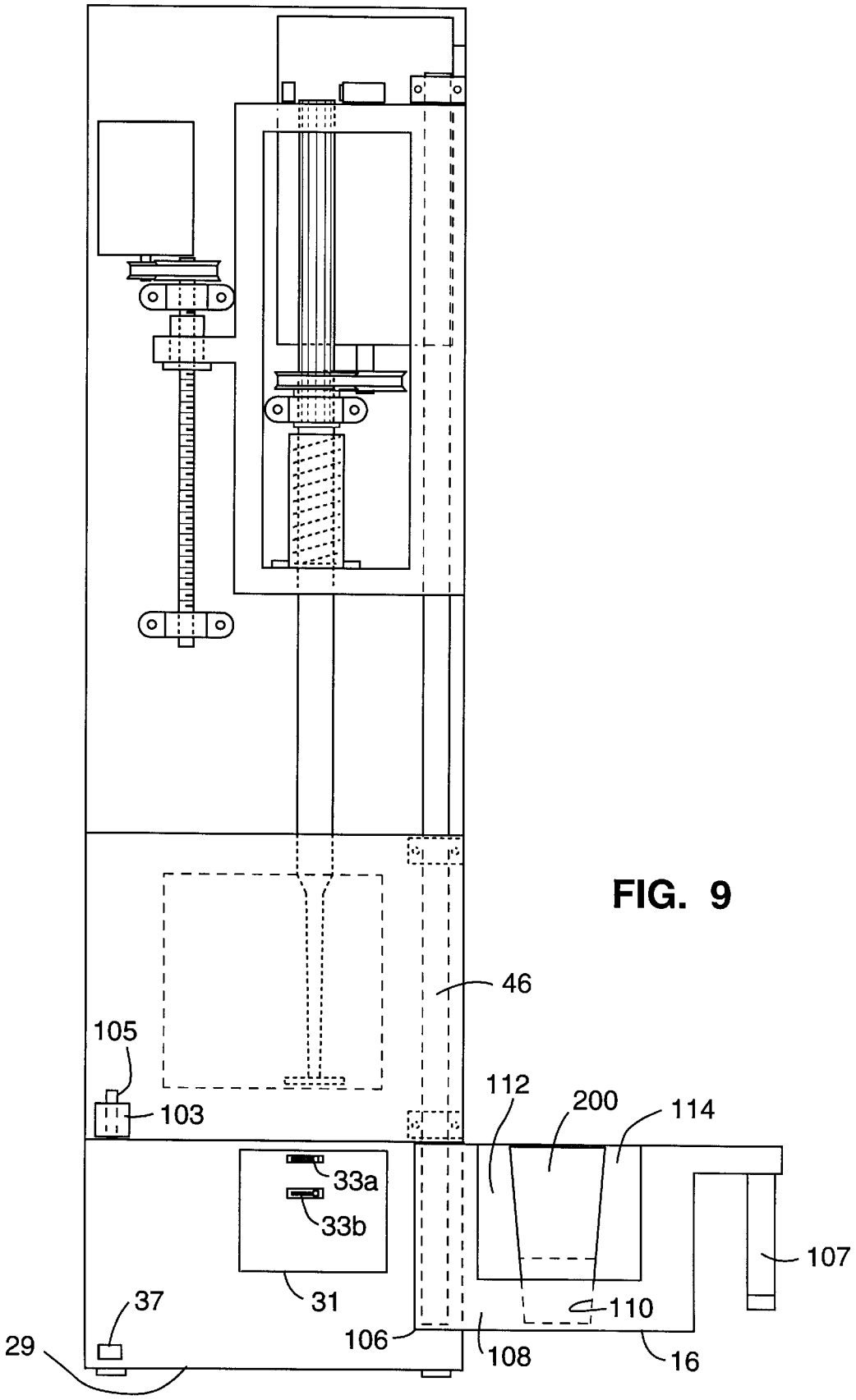


FIG. 9

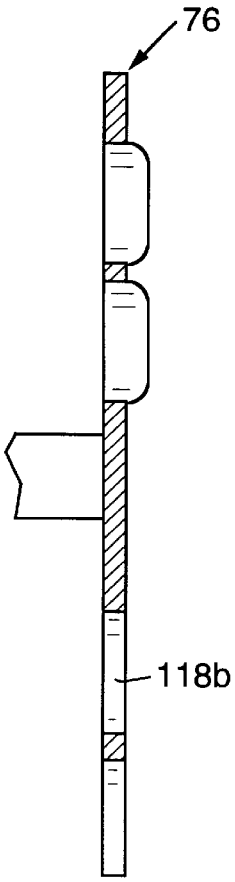


FIG. 10C

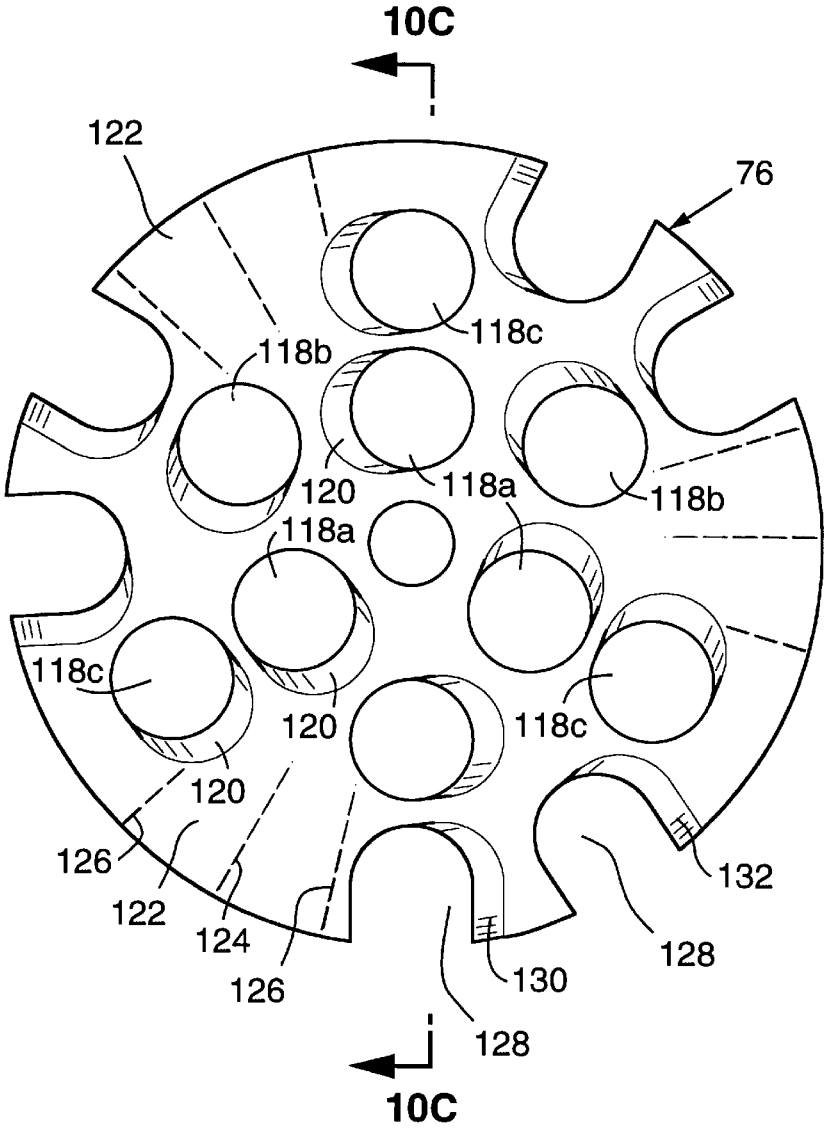


FIG. 10A

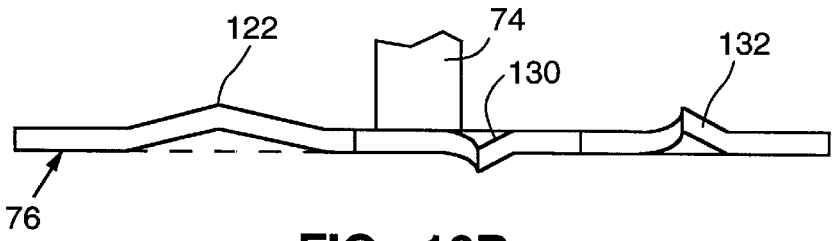


FIG. 10B

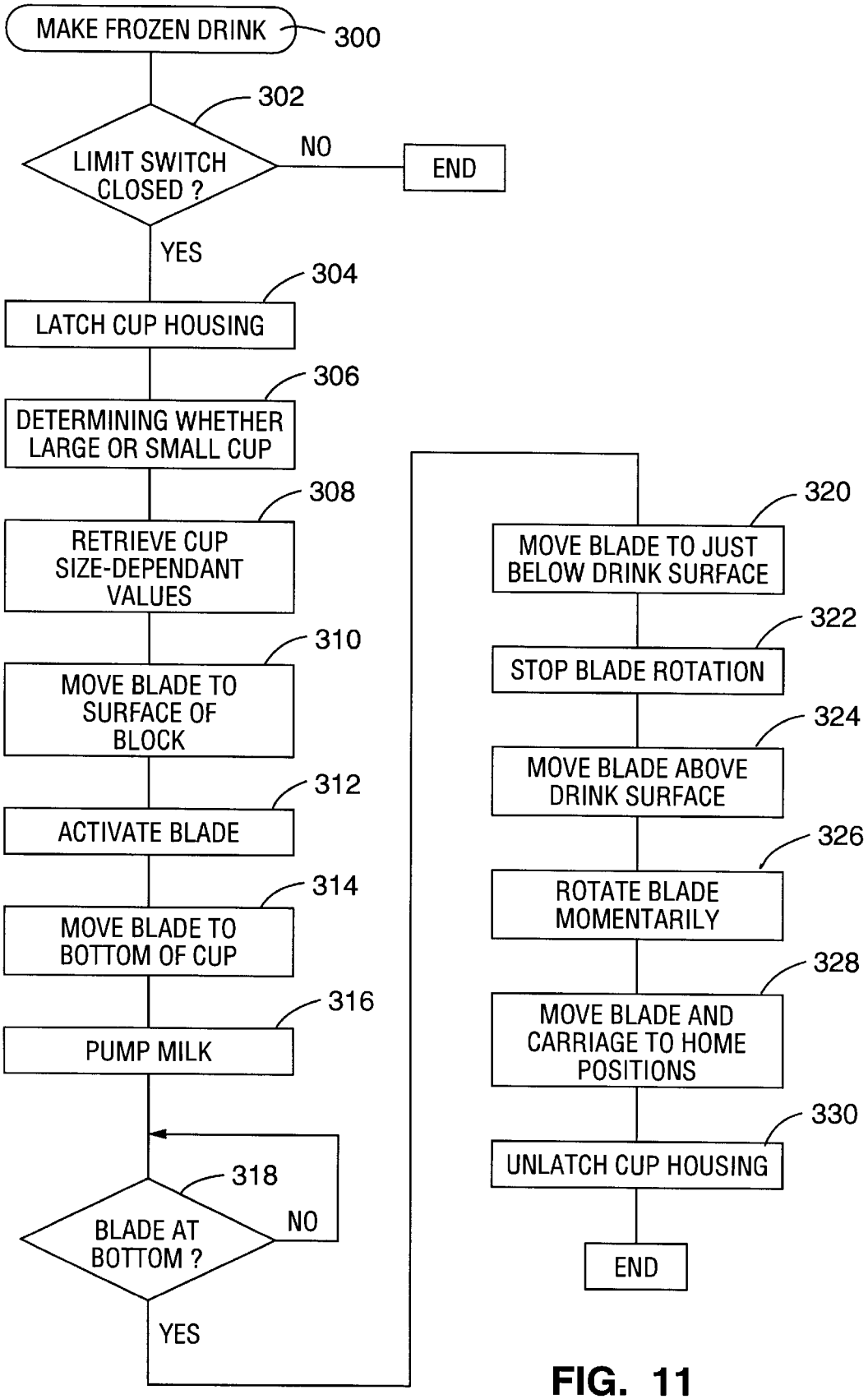

MAKE FROZEN DRINK
300
302
LIMIT SWITCH CLOSED ?
NO
END
YES
304
LATCH CUP HOUSING
306
DETERMINING WHETHER LARGE OR SMALL CUP
308
RETRIEVE CUP SIZE-DEPENDANT VALUES
310
MOVE BLADE TO SURFACE OF BLOCK
312
ACTIVATE BLADE
314
MOVE BLADE TO BOTTOM OF CUP
316
PUMP MILK
318
BLADE AT BOTTOM ?
NO
YES
320
MOVE BLADE TO JUST BELOW DRINK SURFACE
322
STOP BLADE ROTATION
324
MOVE BLADE ABOVE DRINK SURFACE
326
ROTATE BLADE MOMENTARILY
328
MOVE BLADE AND CARRIAGE TO HOME POSITIONS
330
UNLATCH CUP HOUSING
END

FIG. 11

APPARATUS AND METHOD FOR MAKING FROZEN DRINKS

This application is a divisional of application Ser. No. 08/649,534, filed May 17, 1996 now pending.

FIELD OF THE INVENTION

The present invention relates generally to the field of food processing methods and equipment, and particularly to apparatuses and methods for making milkshakes and other frozen drinks.

BACKGROUND OF THE INVENTION

The present invention relates to an improved means of making milkshakes and other frozen drinks. Currently the two commercially prevalent methods of making milkshakes and other frozen drinks are: 1) placing frozen ingredients such as ice cream scoops or ice or frozen fruit into a blending/mixing receptacle, then adding liquid such as milk or juice or water, and then blending them together, or 2) using a dispensing freezer of the type in which liquid ingredients are automatically fed into a freezing cylinder, agitated by a dasher in the cylinder during the freezing operation, and then dispensed when desired through a front discharge valve.

The first method, while delivering an excellent quality milkshake or frozen drink, takes too much time and labor to be viable in high volume fast-food restaurants, where a major portion of the potential market lies. The second method, using a dispensing freezer, dominates the fast-food market, yet possesses several serious short-comings. The required dispensing freezer equipment is expensive to purchase, and very time consuming and expensive to clean and maintain. In addition, the quality of product this equipment produces, by its nature, does not recreate the "old fashioned" style lumpy/slushy texture that can only be achieved by blending frozen ingredients together with liquid ingredients and then serving immediately. Consumers do not respond nearly as favorably to the homogeneous texture produced by the dispensing freezer equipment as they do to the old fashioned texture, and therefore, these dispensing freezer drinks do not sell well, holding less than 3% market share of total restaurant beverage sales today.

The overall goal of this invention is to enable the creation of a consumer preferred old fashioned texture milkshake or other frozen drink that will fit into the operational constraints of today's high volume fast-food restaurants. In order to meet the operational constraints of today's fast-food restaurants this invention was developed to achieve three objectives.

The first objective is to create a milkshake or other frozen drink in 30 seconds or less. In the fast-food market literally every second of preparation time is critical. By enabling preparation time to be reduced by even a few seconds, a number of features of this invention are significant improvements over the existing art.

The second objective is to provide a frozen drink machine which requires very little labor for cleaning between servings or at the end of the day, and which improves safety from bacterial concerns. Both of the existing methods of preparation require excessive amounts of clean-up time, either between servings in the case of the blended method, or at the end of the day in the case of the dispensing freezer. In addition, because this cleaning is often poorly done, or neglected entirely, consumers are often put at risk of consuming unsafe food products. This is a serious health risk which this invention addresses in new and novel ways.

A third object of the present invention is to achieve levels of whipping/aeration of the frozen drink of at least 15% of total volume. This level of whipping is important for two reasons. First, it is critical to keeping ingredient costs of this new method in competitive alignment with milkshakes and frozen drinks produced by dispensing freezers, which are whipped to this level of aeration and higher. Second, whipping also substantially improves flavor delivery of a frozen drink by improving a consumer's ability to taste the drink as their sense of smell senses the frozen drink's aroma trapped inside the tiny bubbles created by the whipping process.

SUMMARY OF THE INVENTION

The present invention is a frozen drink machine and a method for making frozen drinks from a frozen substance which has been frozen into a cup. According to the method and the machine of the present invention, a cup containing a frozen substance is positioned in a cup support located in the frozen drink machine. A rotatable blade having features for grinding the frozen substance and for aerating the ground frozen substance is lowered into the cup, grinding the frozen substance while a liquid is simultaneously introduced into the cup. In an alternative embodiment, a second blade is provided which incorporates air into the liquid before the liquid is introduced into the cup.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a perspective view of a milkshake cup according to the present invention.

FIG. **2** is a front elevation view of a frozen drink machine according to the present invention, in which a front panel is removed to expose the carriage and blade drive assemblies.

FIG. **3** is a side elevation view of the frozen drink machine of FIG. **2**.

FIG. **4**A is a front elevation view of the frozen drink machine of FIG. **2** in which the blending assembly housing has been pivoted to an open condition to expose the interior of the refrigerator housing and to further expose the back side of the blending assembly housing.

FIG. **4**B is a front elevation view, similar to the view of FIG. **4**A, of a second embodiment of the frozen drink machine, in which an assembly for pre-whipping milk before it is added to the frozen substance is included.

FIG. **5**A is a front elevation view of a portion of the carriage, the sleeve mounted to the carriage, and the blade shaft extending through the sleeve and the carriage. The sleeve and carriage are cut-away to more clearly illustrate the structure of the shaft and the contents of the sleeve.

FIG. **5**B is a front elevation view, similar to the view of FIG. **5**A, in which the spring is in a compressed state.

FIG. **6**A is a front elevation view of the frozen drink machine of FIG. **2** showing the carriage at the end of its downward travel and showing the blade moving downwardly within the serving cup.

FIG. **6**B is a front elevation view of the frozen drink machine of FIG. **2** showing the carriage and the blade at the ends of their respective downward travels.

FIG. **7** is a perspective view of the cup housing according to the present invention.

FIGS. **8**A and **8**B are side views of the cup housing of the frozen drink machine of FIG. **1**, showing small and large cups, respectively, positioned in the cup housing.

FIG. **9** is a front elevation view, similar to the view of FIG. **2**, in which the cup support assembly is pivoted into the opened condition.

FIGS. **10**A and **10**B are a top plan view and a side elevation view, respectively, of a blade according to the present invention.

FIG. **10**C is a cross-sectional side view of the blade of FIGS. **10**A and **10**B, taken along the plane designated **10**C—**10**C in FIG. **10**A.

FIG. **11** is a simplified flow diagram showing the functions of the microprocessor of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

Generally speaking, the milkshake and frozen drink machine according to the present invention allows milkshakes and other frozen drinks to be quickly made by breaking up frozen blocks of ingredients into small frozen particles, and combining them with an added liquid. The ingredients to be frozen into frozen blocks are pre-mixed in liquid form, placed into serving cups which are the same serving cups in which the finished milkshake or frozen drinks are to be served, and then frozen into blocks conforming to the insides of the serving cups and stored.

When a milkshake or other frozen drink is to be made, a serving cup containing the frozen block is positioned in the machine. A rotating blade is lowered into the cup and bores through the frozen substance in the cup. Milk or another liquid is added to the cup for blending with the frozen substance, which is broken up into small frozen particles by the boring blade. The machine introduces air into the liquid or the liquid plus frozen particle mixture in order to give the milkshake or frozen drink its proper volume, texture, and flavor delivery.

For the rest of this detailed description, the details of the machine and method will be provided with milkshakes as the end-product being produced, though it is to be understood that end-products such as smoothies or a variety of other frozen drinks can be made by the machine and method described herein.

Cup and Ingredients

A serving cup **200** of the type which may be used in the method and apparatus according to the present invention is shown in FIG. **1**. The exterior surface of the cup **200** includes a plurality of ridges **202**.

When ready for use in the machine according to the present invention, the cup **200** contains milkshake ingredients which are frozen into a block **204** which conforms to the shape of the cup. The block **204** includes an upper surface **206**. The frozen substance preferably comprises all the ingredients required to make a milkshake, with the exception of the milk and the air (which gives the milkshake its volume and texture, and improves flavor delivery). Specifically a cup which will yield a sixteen fluid ounce volume milkshake typically contains a frozen block of approximately six fluid ounces of the same ingredients found in ice cream, but with no air incorporated. It should be pointed out that this differs from placing ice cream in the cup, because ice cream, by definition, contains air which is incorporated during freezing. For instance, the ice cream typically used in old-fashioned scooped type milkshakes typically contains approximately 45% air by volume.

The ingredients are frozen into the cup **200** and form a block of frozen substance that typically fills the cup by less than 50% of its total volume. As will be appreciated below, the full volume of the cup is used to contain milkshake once the milk and air are introduced into the cup during a milkshake making operation.

Milkshake and Frozen Drink Machine

Referring to FIGS. **2** and **3**, the frozen drink machine **10** according to the present invention is comprised generally of a refrigerator housing **12**, a blending assembly housing **14**, and a cup housing **16**.

The refrigerator housing **12** may be a commercially available self-service bulk milk refrigerator dispenser of the type commonly found in cafeterias. For example, the Norris Dispenser Company Model N-5 milk refrigerator may be used. Referring to FIG. **4**A, the refrigerator housing **12** includes a refrigerated compartment **18** having a shelf **20**. Seated on the shelf is a box of milk **22** having a tube **24** extending from its lower face. Tube **24** extends through a peristaltic pump **26** and has an open end **27** positioned within blending assembly housing **14**.

Refrigerator housing **12** includes a base portion **29** which lies below the refrigerated compartment **18**. A block **31** (FIGS. **3** and **4**A) extends from the base portion **29** and supports a pair of limit switches **33***a*, **33***b*.

A microprocessor **35** (FIG. **4**A) is contained within the base portion **29** of the refrigerator housing **12**. As will be discussed in detail below, the microprocessor **35** receives information from the limit switches **33***a*, **33***b* and other sensors which monitor operation of the milkshake machine, and manages the operation of the milkshake machine. A starting switch **37** is located on the front of the refrigerator housing **12** and is interfaced with the microprocessor **35** to deliver starting signals to the milkshake machine when triggered by a user.

Referring to FIG. **3**, blending assembly housing **14** is hinged to the refrigerator housing **12** so that blending assembly housing **14** can be pivoted into the open position shown in FIG. **4**A in order to allow the milk box **22** to be replaced. A support frame **28** is mounted to the blending assembly housing **14**. Upper and lower support members **30** extend laterally from support frame **28**.

Referring to FIGS. **2** and **3**, two motors are mounted to frame **28** within the housing **14**: a carriage motor **32** and a blade motor **34**. Carriage motor **32** includes a shaft **36** which spins when the motor is activated. Shaft **36** is coupled to a first pulley **38** and a belt **39** is driven by first pulley **38**. Carriage motor **32** is preferably a stepper motor capable of 1500 RPM and 140 ounce-inches of torque.

Blade motor **34** is preferably a one horsepower motor capable of up to 3400 revolutions per minute. It includes a rotatable shaft **40** which is coupled to a second pulley **42** such that activation of the blade motor **34** results in rotation of the second pulley **42**. A belt **43** is driven by second pulley **42**.

A carriage **44** is located within the housing **14**. An elongated rod **46** (FIG. **2**) extends through a bore **48** in the carriage **44** and is fixed to the support members **45**. Rod **46** is secured to the blending assembly housing **14** by a number of mounting blocks **50**. The bore **48** is proportioned such that the carriage **44** can slide easily along the rod **46**, and linear bearings (not shown) are pressed into the ends of bore **48** to aid the sliding motion.

Referring to FIG. **2**, carriage **44** includes a laterally extending member **52** having a bore **54**. A ball nut **56** is secured within the bore **54**, and a vertical screw drive **58** extends through the ball nut **56**. The screw drive **58** is mounted to the support frame **28** by a pair of mounting members **60**.

A third pulley **61** is attached to one end of screw drive **58**. Belt **39** is coupled to pulley **61** such that rotation of pulley **38** results in corresponding rotation of third pulley **61**. Thus, activation of carriage motor **32** results in rotation of screw

drive **58**. When screw drive **58** is rotated in this manner, ball nut **56** is caused to travel vertically along the screw drive **58** and to thereby move the carriage **44** vertically upward or downward, depending on the direction in which the screw drive is rotating.

Carriage **44** is a substantially rectangular frame having a rectangular center opening **62**. A bore **64** extends through the upper end of the carriage **44** and into the opening **62**. A splined spindle shaft **66** is slidably disposed in the bore **64**. Splined shaft **66** extends through a bearing **68** which is mounted to the support frame **28** by a support **69**. A fourth pulley **71**, which is internally splined, is attached to the bearing **68** and belt **43** is coupled to fourth pulley **71**. Thus, rotation of second pulley **42**, such as by activation of blade motor **34**, causes resultant rotation of splined fourth pulley **71**.

During rotation of splined pulley **71**, the splines in splined shaft **66** and splined pulley **71** are rotationally engaged with one another such that rotation of splined pulley **71** causes rotation of splined shaft **66**. This engagement, however, does not prevent the splined shaft **66** from sliding vertically within the splined pulley **71** and bearing **68** during vertical movement of the carriage **44**.

Splined shaft **66** includes a smooth section **70**. A collar **72** (FIGS. **5**A and **5**B) surrounds and is fixed to the smooth section **70** of shaft **66**. Shaft **66** further includes a tapered section **74** and a blade **76** attached to the tapered section **74**.

Referring to FIG. **5**A, smooth section **70** of shaft **66** extends through a sleeve **78** mounted to the carriage **44** within the opening **62** (opening **62** shown in FIG. **2**). A shoulder **82** is formed at the top of sleeve **78**.

A compression spring **80** surrounds the shaft section **70** and is housed within the sleeve **78**. Spring **80** has a first end **84** which abuts the shoulder **82** and a second end **86** which abuts collar **72**. When carriage **44** advances downwardly in the direction indicated by arrow A**1**, and blade **76** reaches the surface **206** of the frozen substance **204** in the cup, spring **80** becomes compressed between shoulder **82** and collar **72** as indicated in FIG. **5**B. Gradually, shaft **66** slides downwardly, as indicated by arrow A**2** in FIG. **5**B, through the sleeve **78** until spring **80** returns to its relaxed condition shown in FIG. **5**A.

Referring to FIGS. **6**A and **6**B, an optical detector **88** is mounted to the top of carriage **44**. Optical detector includes a light source **90** and a receiver **92** which detects light emitted by light source **90**. Optical detector **88** is positioned to detect whether the upper end of splined shaft **66** is extending above the carriage **44**. When the upper end of the shaft **66** extends above the carriage **44**, receiver **92** is prevented from receiving light emitted by light source **90**. When the carriage **44** is lowered and the upper end of the splined shaft **66** can be detected by the optical detector **88**, it indicates that the blade **76** has not yet reached the bottom of the serving cup **200** which contains the milkshake ingredients.

Optical detector **88** is electronically coupled to microprocessor **35** (FIG. **4**A). When the blade **76** reaches the bottom of the serving cup **200** during use of the milkshake machine, this information is received by the microprocessor **35** and used to control the milkshake making operation as will be discussed below.

Referring to FIGS. **3**, **4**A and **7**, support frame **28** has a lower portion **94** positioned above the cup housing **16**. Lower portion **94** includes a cooled recessed section **96** which, when the blending assembly housing **14** is pivoted to the closed condition shown in FIG. **3**, faces the portion of the refrigerated compartment **18** which lies below shelf **20**. Because the refrigerated compartment **18** is cooled by its internal refrigeration unit, and because the recessed section **96** is exposed to the refrigerated compartment **18**, the recessed section **96** is likewise cooled to a temperature of approximately 40° F. or below.

Recessed section **96** is bounded by three side walls **98**, a top wall **100** (FIG. **4**A), and a bottom wall **102**. Openings **104***a*, **104***b* shown in FIG. **3**, are formed in top and bottom walls **102**. These openings permit the blade **76** to extend into the recessed section **96** and to pass from the recessed section into the cup **200**.

A solenoid latch **103** having a plunger **105** (FIGS. **8**A and **8**B) is attached to lower portion **94** of housing **14**. The solenoid latch **103** works in a conventional manner. Plunger **105** is spring biased in the elevated condition shown in FIG. **9**. When solenoid latch **103** is energized, plunger **105** slides vertically downward to the latched position shown in FIGS. **8**A and **8***b*.

Referring to FIG. **9**, cup housing **16** includes a side section **106** which is hinged to the rod **46**. Cup housing is pivotable about the rod **46** between the closed position shown in FIG. **2** and the open position shown in FIG. **9**. A handle **107** is provided to permit the cup housing to be easily pivoted between the closed and open positions. When the solenoid plunger **105** is in the latched position shown in FIG. **8**A, it prevents the cup housing from being moved to the open position.

Referring to FIG. **9**, cup housing **16** includes a tray **108** which is provided with a cut-out **110** for receiving a serving cup **200**. The portion **114** of the cup housing **16** above the tray is open.

Cup housing **16** further includes an outer wall **112** which, when the cup housing is in the closed position, causes the cup **200** to be enclosed between the outer wall **112** and base portion **29** of refrigerator housing **12**. Moreover, and as best shown in FIGS. **8**A and **8**B, when the cup housing **16** is in the closed condition, the block **31** which is attached to refrigerator housing **12** extends into the open portion **114** of the cup housing **16**. The wall **112** and the block **31** are important because they prevent access to the cup during the processing cycle, when it would be very dangerous to disturb the cup due to the sharp blade spinning at high RPM inside the cup.

Referring again to FIGS. **8**A and **8**B, when a cup is positioned in the cup housing and the cup housing placed in the closed condition, the cup depresses at least one of the limit switches **33***a*, **33***b*. A short cup **200***b*, shown in FIG. **8**A, will depress only lower limit switch **33***b*, whereas a tall cup **200***a*, shown in FIG. **8**B will depress both lower and upper limit switches **33***a*, **33***b*. The switches **33***a*, **33***b* provide a means by which the presence of a cup in the cup housing may be detected. As will be described in detail below, when at least one of the switches **33***a*, **33***b* is closed, the microprocessor activates solenoid latch **103**, causing the cup housing **16** to be locked in the closed condition and generates starting signals which cause the frozen drink making cycle to begin.

The limit switches **33***a*, **33***b* also deliver information to the microprocessor **35** (FIG. **4**A) concerning the size of the cup which is positioned in the cup housing. As detailed below, this will ensure that the appropriate quantity of milk is delivered into the cup for the size milkshake which is to be made. Also, because the surface **206** (FIG. **1**) of the frozen block **204** is lower in a smaller cup than in a relatively larger cup, the microprocessor can ensure that the blade **76** is lowered to the proper height before it is caused to begin spinning.

Referring to the perspective view of FIG. **7**, cut-out **110** includes ridges **116** around its perimeter. These ridges are designed to engage with like ridges **202** on the outside surface of the serving cup **200**. This prevents cup **200** from rotating within the cut-out **110** as the rotating blade advances through the frozen substance.

Blade

FIGS. **10**A and **10**B are top and side views, respectively, of blade **76**. Blade **76** is preferably a 2.5 inch diameter stainless steel blade having a circular shape and a thickness of approximately 0.080 inches. Three-eighth inch diameter holes **118***a*, **118***b* and **118***c* are spaced 120° apart rotationally and at specific radiuses from the center of the blade such that as the blade makes one complete rotation, the entire surface area of the frozen substance will have been passed over by three holes. Holes **118***a* are centered 0.041 inches from the blade's center, and holes **118***b* and **118***c* are spaced 0.062 inches and 0.083 inches from the blade's center respectively. Depressed regions **120**, best shown in the cross section view of FIG. **10**C, are formed immediately adjacent to each of the holes, located on their trailing edge as the blade rotates. These regions are depressed by 0.080 inches. The holes and the depressed regions are arranged such that as the blade **76** is rotated and advanced into the frozen substance in the cup **200** (FIG. **1**), the holes **118***a–c* and depressed regions **120** grate through the frozen substance much like the grating action of a cheese grater. It should be appreciated that the blade of FIG. **10**A is configured such that clockwise rotation of this blade produces the desired grating effect. This arrangement also provides for easy manufacture in a stamping operation, and maintains the mechanical strength of the blade so that its outside edges are not deflected upward by the force of the frozen substance being bored through. Other arrangements with differing size or shaped holes will also work well.

Three waves are formed in the blade. As shown in FIGS. **10**A and **10**C, each of the waves **122** includes a center crease **124** which is elevated above the plane of the blade and side creases **126** which lie in the plane of the blade. The creases **124** and **126** are approximately ½ inches in length and extend radially from the perimeter of the blade. A distance along the perimeter of the blade of approximately ½ inch separates each pair of side creases **126**. During high speed rotation of the blade, the waves **122** increase the whipping effect of the blade by causing an alternately high and low pressure zone at the blade's edge, creating turbulent eddies which cause a whipping effect.

Three pairs of cutouts **128** are formed along the perimeter of the blade **76**, spaced 120° from each other. Each pair includes a first cutout which has a depressed trailing edge **130** and a second cutout which has an elevated trailing edge **132**. During a milkshake making operation, the trailing edge **130** is depressed to act as a grating surface to bore through the frozen substance at the outermost radius of the blade. The trailing edge **132** is elevated to act as a inverted ramped surface to force milkshake downward in the cup and thereby minimize the amount of milkshake that is driven up the interior walls of the cup by centrifugal force. Moreover, by directing milkshake ingredients above the blade, which are carried to the outer edge of the blade by centrifugal force, to then be forced downward and under the blade as the rotating blade moves upward, the elevated trailing edge **132** helps prevent the blade from carrying ingredients up and out of the cup as the blade is lifted from the cup.

Operation

Operation of the frozen drink machine according to the present invention will next be described.

First, cup housing **16** is pivoted to the opened condition shown in FIG. **9** and a cup **200** containing the frozen substance **204** is positioned in the cut-out **110**. Cup housing **16** is then pivoted to the closed position shown in FIG. **2**.

Next, carriage motor **32** is activated. Activation of carriage motor **32** causes rotation of carriage motor shaft **36** and pulley **38**, and through belt **39** further causes rotation of pulley **61** which is attached to the vertical screw drive shaft **58**, causing it to rotate. Counterclockwise rotation of screw drive shaft **58**, when viewed from the top, causes carriage **44** to advance vertically downward as indicated by arrow A**3** in FIG. **2**. Carriage **44** has spindle shaft **66** mounted to it such that when carriage **44** advances vertically downward, spindle shaft **66** advances downward as well, with one exception which will be explained shortly. As blade **76**, attached to the bottom of spindle shaft **66**, approaches the surface **206** of the frozen substance **204**, blade motor **34** is activated causing rotation of pulley **42**, and through belt **43**, rotation of pulley **71** which is attached to spindle shaft **66**, causing it and blade **76** to spin. Downward travel of carriage **44** continues and blade **76** makes contact with the surface **206** of the frozen substance and begins boring down through it.

At the time boring begins, the milk pump is activated and begins pumping milk into the cup through tube **24** for mixing and whipping with the small frozen particulate being created by the boring action of the blade. Approximately six ounces of milk is pumped into the cup over a period of approximately three to five seconds, depending on the desired consistency of the finished milkshake.

The downward travel of the carriage **44** is generally driven at a rate faster than the blade **76** can bore through the frozen substance in the cup. This disparity in downward travel rates causes the downward travel of the spindle shaft **66**, to which the blade **76** is attached, to be slower than the downward travel of carriage **44**. This forces the spindle shaft **66** to move upward within its mountings on the carriage **44** and for spring **80** to be compressed as shown in FIG. **6**A. The carriage **44** is driven to its lowest most point of travel, as shown in FIG. **6**B, and then the carriage motor **32** is deactivated.

The blade **76** continues to grate and blend the frozen substance **204** within the cup **200** as it moves downward in the cup, driven by the gradual relaxation of the compressed spring **80** (FIGS. **5**B and **6**A) acting on spindle shaft **70**. When the optical detector **88** senses that the spindle shaft has progressed all the way to the bottom of the cup as shown in FIG. **6**B, the boring stage of the process is complete.

The reason for this spring release arrangement is to allow for a high rate of travel speed of the carriage **44** from its uppermost position at the beginning of the cycle to the bottom of its travel. This is advantageous because it allows the blade **76** to bore as quickly as the frozen substance will allow. Softer frozen substances can be bored through more quickly. Without this spring release arrangement, time would be wasted as the carriage **44** would have to be driven downward as slowly as the hardest frozen substance could be bored through in order to be sure the blade motor **34** is not stalled out by an excessive torque requirement to continue the blade's rotation. An additional advantage is that the exact rotational speed for the carriage motor **32**, driving the downward travel of the carriage during boring, becomes less critical. This simplifies the controls required for this motor.

Given these two advantages of the spring release it can be appreciated that the same advantages could be accomplished through a variety of other means, including placing the spring mechanism on the screw drive shaft or its mountings

rather than on the spindle shaft, or placing a slip clutch in the connection of the carriage motor to the screw drive shaft which would slip as the spindle and carriage's downward travel was caused to slow down by the resistance of the boring blade against the frozen substance.

With the boring stage complete, as signaled by the optical detector **88** when the blade **76** reaches the bottom of the cup, the carriage motor **32** is caused to reverse polarity and is activated to begin to move the carriage, and with it, the spindle drive shaft and blade, upward as indicated by arrow **A4** in FIG. **6**B. At this point in the process the rotating blade **76** acts as a mixing and whipping agitator, with the important feature of being formed such that its slim cross-sectional profile does not cause excessive rotation of the entire contents of the cup. The carriage motor **32** raises the carriage, and with it, the rotating blade up through the milkshake, completing the mixing and whipping of the frozen particulate and milk into a milkshake as it travels vertically through it.

Some formulations of milkshake benefit from a second vertical pass of the mixing/whipping blade through the milkshake, in which case the mixing blade's vertical travel is stopped one inch below the surface **210** of the milkshake **212** (labelled in FIG. **6**B), and the polarity of the carriage motor **32** is again reversed and the blade **76** is moved back down to the bottom of the cup. Upon reaching the bottom, the polarity of the carriage motor **32** is again reversed and the blade is moved back upward in the cup **200** to a point one inch below the surface **210** of the milkshake **212**.

With the mixing and whipping process complete, and the blade reaching the point one inch below the surface **210** (FIG. **6**B) of the milkshake **212**, the blade motor **34** is deactivated and a braking force applied to the blade motor to slow its rotational speed. This slowing of the blade's rotational speed prevents splattering of milkshake out of the cup as the blade breaks through the surface **210** of the milkshake **212**. With the rotation slowed, the carriage moves up to a point where the blade is approximately one half inch above the surface **210** of the milkshake **212**, but still below the top lip of the cup, and stops momentarily. With the carriage stopped momentarily, the blade motor is reactivated momentarily, causing the blade to spin and fling any remaining milkshake material off the blade and back into the cup below its upper lip. After a momentary spinning of approximately one half second, the blade motor **34** is deactivated, and the carriage motor **32** reactivated to bring the carriage and blade upward to its original position above the cup. At this point the process is complete and the cup can be removed for serving by opening cup housing **16** and removing cup **200** from the recess **110**.

As shown in FIG. **2**, when the carriage **44** and blade **76** are in their original positions, the blade **76** and the narrow portion **75** of shaft **70** are disposed within recessed section **96** of the housing **14**. As described above, this section of the housing is cooled by the refrigerated compartment **18** and is thereby maintained at bacteriologically safe temperatures. Accordingly, blade **76** and shaft section **74** need not be washed between milkshake making operations, even if the milkshake making operations are separated by several minutes or hours. The cooled compartment minimizes the risk that residual milk left on these components will sour and/or promote bacteria formation.

Microprocessor Control

The functions of the microprocessor **35** in controlling the frozen drink making operation will next be discussed with reference to FIG. **11**. A frozen drink making operation is commenced at step **300** when a user presses the start button **37** (FIG. **2**). Next, the microprocessor **35** detects whether at least one of the limit switches **33***a*, **33***b* (FIGS. **8**A and **8**B) is closed, which indicates the presence of a cup **200** in the cup housing **16**. If a limit switch is closed, the microprocessor **35** causes activation of the solenoid latch **103**, step **304**, such that plunger **105** moves to the latched condition shown in FIG. **8**A to latch the cup housing **16**. If a limit switch is not closed, the microprocessor terminates the milkshake making procedure or it may alternatively continue monitoring the limit switches for a predetermined period of time.

Next, at step **306** the microprocessor **35** determines whether a tall cup **200***a* (FIG. **8**B) or a short cup **200***b* (FIG. **8**A) is positioned in the cup housing **16** by determining whether only one limit switch **33***b* is closed, indicating a small cup, or whether both limit switches **33***a*, **33***b* are closed, indicating a large cup.

At step **308**, the microprocessor retrieves certain cup size-dependent values from look up tables stored in its memory. For example, because a larger quantity of milk is needed for a large milkshake than for a small milkshake, one of the stored values is the length of time for which the peristaltic pump **26** will be made to pump milk into the cup **200**. The other stored values include (1) those indicating the distance to be travelled, or the amount of time for travel, by the carriage **44** to position the blade **76** at the surface **206** of the frozen block **204**, which will be higher for a large cup than it will for a small cup; (2) those indicating the distance to be travelled (or the amount of time for travel) by the carriage from the surface **206** of the frozen block **204** to the bottom of the cup; (3) those indicating the distance to be travelled (or the amount of time for travel) by the carriage to lift the blade from the milkshake to a height just below the upper surface **210** (FIG. **6**B) of the milkshake **212**; and (4) those indicating the distance to be travelled (or the amount of time for travel) by the carriage to lift the blade from the milkshake to a height just above the upper surface **210** of the milkshake **212**.

During steps **310** through **316**, the stored values retrieved at step **308** are used to generate control signals which control the carriage motor **32**, blade motor **34**, and peristaltic pump **26**. Specifically, the microprocessor at step **310** instructs the carriage motor **32** to advance the carriage by the appropriate number of steps to position the blade **76** just above the surface **206** of the frozen block. At step **312** the microprocessor further directs the carriage motor **32** to advance the carriage **44** by the appropriate number of steps which will cause the blade **76** to move to the bottom of the cup (step **314**). At step **316**, the microprocessor delivers control signals to cause the peristaltic pump **26** to pump milk into the cup through opening **37** for the amount of time which will deliver the proper quantity of milk into the cup. It should be appreciated that if the embodiment of FIG. **4**B is used, the microprocessor would also initiation rotation of whipping motor **140** at this step in the process and whipped milk would be delivered into the cup through outlet **148**.

At step **318**, the microprocessor looks to the optical sensor **88** and awaits a signal from the optical sensor indicating that the blade **76** has reached the bottom of the cup (FIG. **6**B). When the blade **76** has reached the bottom of the cup, the microprocessor instructs (steps **320**) the carriage motor **32** to move the carriage **44** vertically upward by an amount which will position the blade **76** approximately one inch below the milkshake surface **210**.

Next, the microprocessor directs the blade motor **34** (step **322**) to deactivate and thereby slows the rotation of the blade **76**. As described above, this prevents splattering of milk-

shake out of the cup as the blade breaks through the surface **210** of the milkshake **212**.

Next, at step **324**, the carriage motor **32** is caused to advance the carriage **44** such that the blade **76** is approximately one half inch above the surface **210** of the milkshake **212**, but still below the top lip of the cup **200**. With the carriage stopped momentarily, the microprocessor reactivates the blade motor **34** for approximately 0.5 seconds (step **326**), causing the blade to spin and fling any remaining milkshake ingredients off the blade and back into the cup below its upper lip. At step **328**, which occurs after the reactivation of the blade motor **34**, the carriage motor **32** is instructed to move the carriage **44** and blade **76** into their original positions above the cup **200**. Finally, at step **330**, the microprocessor **35** causes deactivation of the solenoid latch **103**, causing plunger **105** to move to the unlatched position shown in FIG. **9**, allowing the cup housing **16** to be opened by a user.

Alternative Embodiment

As described above, it is important to the milkshake consistency to have air whipped into the milk or milkshake before the milkshake is served. This may be accomplished in the manner described with respect to the first embodiment, in which aeration of the milk and/or milkshake occurs due to the action of the blade **76** within the cup.

Alternatively, the milk may be whipped by a separate whipping blade which acts on the milk before the milk is introduced into the cup **200**. Referring to FIG. **4**B, a whipping blade **140** may be provided for this purpose. Whipping blade **140** is mounted to the end of a shaft **142** which is rotatably coupled to a whipping motor **144**. Motor **144** is mounted to the support frame **28**.

The whipping blade **140**, shaft **142** and motor **144** may be of the type commonly found on traditional milkshake blenders, such as the Model **936** made by Hamilton Beach. Whipping blade, shaft, and whipping motor are mounted within the blending assembly housing **14** such that the whipping blade **140** and the shaft **142** extend into the refrigerated section **96** and such that whipping blade **140** extends into a vessel **146**.

The tubing **24** which extends from the box **22** of milk is connected to the vessel **146** such that milk is pumped by the peristaltic pump **26** into the bottom of vessel **146**. Air is introduced into the milk by the whipping action of the whipping blade **140**. Further pumping of the peristaltic pump **26** causes the milk to exit the vessel **146** via an outlet **148** directed into the cup **200**. These components are preferably disposed within the refrigerated section **96** in order to prevent possible souring of the milk and bacterial formation.

The remaining features of the embodiment of FIG. **4**B are identical to those of the embodiment of FIG. **2** and will not be described in detail.

The present invention has been described with respect to first and second embodiments, however, it should be appreciated that the invention described herein should be limited only in terms of the appended claims and not be restricted by any of the described embodiments.

I claim:

1. An apparatus for making frozen drinks from a frozen substance frozen into a cup, comprising:

a housing;

a cup support mounted to the housing;

a liquid dispenser having an outlet positioned to direct liquid into a cup positioned in the cup support;

grinding means for, when a cup containing a frozen substance is positioned in the cup support, grinding the frozen substance to form a ground substance; and

aeration means for, when a cup containing a frozen substance is positioned in the cup support, causing air to be incorporated into a mixture of the ground substance formed by the grinding means and the liquid dispensed by the liquid dispenser.

2. The apparatus of claim **1** wherein the grinding and aeration means comprise a rotatable blade assembly mounted within the housing for extension into a cup positioned in the cup support.

3. The apparatus of claim **2** wherein the blade assembly includes a blade member mounted on a shaft, the blade member including first regions lying within a plane and spaced apart regions at least partially outside the plane such that during rotation of the blade member in a fluid, the aeration elements cause alternately high and low pressure zones in the fluid and thus create turbulent eddies which cause a whipping effect.

4. The apparatus of claim **2** wherein the blade assembly is moveable between upper and lower blade positions, the lower blade position being at a height such that when a cup is positioned in the cup support, the blade assembly is positioned within the cup and adjacent to the cup bottom, and wherein the apparatus further includes control means for causing the blade assembly to move between the upper and lower blade positions at least twice.

5. The apparatus of claim **2** further comprising:

a cup sensor for detecting the size of a cup in the cup support and for producing an output corresponding to the size of the cup; and

control means responsive to the output of the cup sensor for generating blade rotation speed and vertical blade positioning control signals which correspond to the size of the cup detected by the cup sensor, the blade assembly being responsive to the blade rotation speed and vertical blade positioning control signals.

6. The apparatus of claim **2** further comprising:

an initiation switch;

a cup sensor for detecting the presence of a cup in the cup support and for producing an output;

control means for generating up and down blade movement control signals and blade rotation control signals;

a slidable and rotatable shaft attached to the blade assembly and moveable between upper and lower positions corresponding to upper and lower blade positions;

first and second motors coupled to the shaft, the first motor responsive to the blade movement control signals to move the shaft between the upper and lower positions, the second motor responsive to the blade rotation control signals to rotate the blade assembly, the control means responsive to activation of the initiation switch and to output of the cup sensor to allow the blade assembly to rotate and to be lowered into a cup when a cup is detected in the cup support and when a user activates the initiation switch.

7. The apparatus of claim **2** wherein the apparatus is for making a frozen drink having a top surface and wherein:

the blade assembly is moveable between upper and lower blade positions; and

the control means is further for generating blade speed control signals to reduce the rotational speed of the blade assembly when the blade assembly is moved to a first level and to increase the rotational speed of the blade assembly when the blade assembly is moved to a second level, the first level corresponding to a level beneath the top surface of a frozen drink in a cup positioned in the cup support, and the second level corresponding to a level above said top surface.

8. The apparatus of claim 1 wherein:

the grinding means includes a first blade mounted within the housing for extension into a cup positioned in the cup support;

the liquid dispenser includes a vessel and the outlet is positioned to direct liquid from the vessel into a cup positioned in the cup support; and

the aeration means includes a second rotatable blade extending into the vessel.

9. The apparatus of claim 1 further comprising:

a cup sensor for detecting a characteristic of a cup in the cup support and for producing an output corresponding to the characteristic of the cup; and

control means for generating liquid dispensing control signals which correspond to the characteristic of the cup detected by the cup sensor, the liquid dispenser being responsive to the liquid dispensing control signals to dispense liquid into the cup.

10. The apparatus of claim 9 wherein the characteristic is the size of the cup and wherein the liquid dispenser is responsive to the liquid dispensing control signals to dispense a volume of liquid which corresponds to size of the cup.

11. An apparatus for making frozen drinks from a frozen substance frozen into a cup, comprising:

a housing;

a cup support mounted to the housing;

a rotatable blade assembly mounted within the housing, the blade assembly including shaving elements and aeration elements, the blade assembly moveable between upper and lower blade positions, the lower blade position being at a height such that when a cup is positioned in the cup support, the blade assembly is positioned within the cup and adjacent to the cup bottom.

12. The apparatus of claim 11 characterized further in that the blade assembly includes at least one surface area shaped to pump fluid toward the bottom of the cup in response to rotation of the blade assembly.

13. The apparatus of claim 11 wherein the blade assembly shaving elements and aeration elements are in close vertical proximity to one another.

14. The apparatus of claim 11 wherein the aeration elements include first regions lying within a plane and spaced apart regions at least partially outside the plane such that during rotation of the blade assembly in a fluid the aeration elements cause alternately high and low pressure zones in the fluid, and thus create turbulent eddies which cause a whipping effect.

15. The apparatus of claim 11 further comprising:

a rod mounted with the housing;

a carriage slidable on the rod between upper and lower carriage positions corresponding to the upper and lower blade positions, the rotatable blade assembly being carried by the carriage;

a first motor coupled to the carriage for movement of the carriage between upper and lower positions corresponding to the upper and lower blade positions.

16. The apparatus of claim 11 wherein the grating elements include depressed edges formed adjacent openings in the blade assembly.

17. The apparatus of claim 11 wherein the blade assembly includes an upper surface and wherein the apparatus further comprises means for, when the blade assembly is immersed and rotated in a cup containing liquid, directing liquid from above the upper surface of the blade assembly to below the blade assembly.

18. The apparatus of claim 11 wherein the apparatus further includes control means for causing the blade assembly to move between the upper and lower blade positions at least twice.

19. The apparatus of claim 11 further including:

an initiation switch configured to produce an output when activated by a user;

a cup sensor for detecting the presence of a cup in the cup support and for producing an output;

control means responsive to activation of the initiation switch and to the output of the cup sensor to cause the blade assembly to rotate and to be lowered into a cup when a cup is positioned into the cup support when a cup is detected in the cup support and when a user activates the initiation switch.

20. The apparatus of claim 11 further comprising:

a threaded guide rod mounted within the housing;

a slidable and rotatable blade shaft having the blade assembly attached thereto, the blade shaft drivable between upper and lower positions by rotation of the threaded guide rod; and

a first motor coupled to the threaded rod for driving the slidable and rotatable blade shaft between upper and lower positions corresponding to the upper and lower blade positions.

21. The apparatus of claim 20 wherein:

the apparatus further includes control means for generating slidable blade shaft movement control signals and blade rotation control signals, the first motor responsive to the slidable blade shaft movement control signals to move the slidable blade shaft between the upper and lower positions; and

a second motor responsive to the blade rotation control signals to rotate the blade assembly.

22. The apparatus of claim 21 wherein:

the apparatus further comprises an initiation switch and a cup sensor for detecting the presence of a cup in the cup support and for producing an output; and

the control means is further for generating the blade movement control signals and the blade rotation control signals in response to activation of the initiation switch and the output of the cup sensor to allow the blade assembly to rotate and to be lowered into a cup when a cup is detected in the cup support and when a user activates the initiation switch.

23. The apparatus of claim 11 wherein the apparatus is for making a frozen drink having a top surface and wherein the apparatus includes:

a cup sensor for detecting the presence of a cup in the cup support and for producing an output; and

control means for generating blade speed control signals to reduce the rotational speed of the blade assembly when the blade assembly is moved to a first level and to increase the rotational speed of the blade assembly when the blade assembly is moved to a second level, the first level corresponding to a level beneath the top surface of a frozen drink in a cup positioned in the cup support, and the second level corresponding to a level above said top surface.

24. The apparatus of claim 11 further comprising:

a cup sensor for detecting the size of a cup in the cup support and for producing an output corresponding to the size of the cup; and

control means responsive to the output of the cup sensor for generating blade rotation speed and vertical blade positioning control signals which correspond to the size of the cup detected by the cup sensor, the blade assembly being responsive to the blade rotation speed and vertical blade positioning control signals.

25. The apparatus of claim **11**, further comprising

a cup sensor for detecting a characteritic of a cup in the cup support and for producing an output corresponding to the characteristic of the cup; and

control means for generating liquid dispensing control signals which correspond to the characteristic of the cup detected by the cup sensor, the liquid dispensing being responsive to the liquid dispensing control signals.

26. The apparatus of claim **25** wherein the charateristic is the size of the cup and wherein the liquid dispenser is responsive to the liquid despensing control signals to dispense a predeterminded volume of liquid corresponding to the size of the cup.

27. An apparatus for making frozen drinks from a frozen substance frozen into a cup, comprising:

a housing;

a cup support mounted to the housing;

a liquid dispenser having an outlet positioned to direct a predetermined volume of liquid into a cup position in the cup support;

a shaft mounted to the housing the shaft carrying a rotatable blade having shaving elements and aeration elements formed thereon, the shaft moveable relative to the housing to carry the blade between an upper blade position remote from the cup support and a lower blade position adjacent to the cup support, the blade configured to, when it is lowered into a cup containing frozen substance, shave the frozen substance, mix the frozen substance with liquid dispensed by the liquid dispenser, and incorporate air into the formed mixture of frozen substance and liquid.

* * * * *

EXHIBIT 2

US007144150B2

(12) **United States Patent**
Farrell

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(54) **RINSEABLE SPLASH SHIELD AND METHOD OF USE**

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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 150 days.

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(52) **U.S. Cl.** ..... **366/197**; 366/347; 366/348; 366/349; 134/115 R

(58) **Field of Classification Search** ..... 366/207, 366/347, 348, 349, 197; 134/26, 29, 34, 134/36, 42, 104.1, 166 R, 169 R, 115 R
See application file for complete search history.

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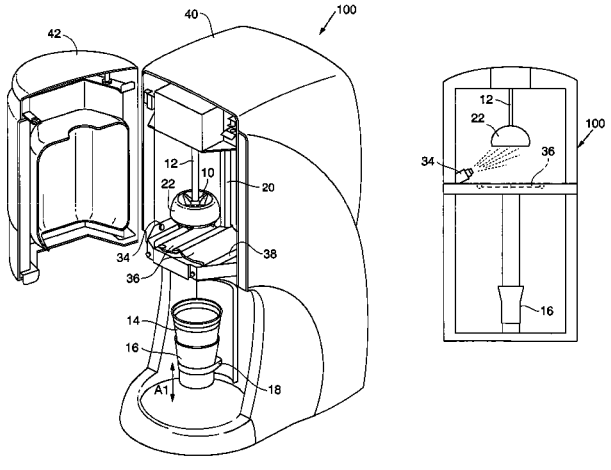
Primary Examiner—Tony G. Soohoo
(74) *Attorney, Agent, or Firm*—Stallman & Pollock LLP

(57) **ABSTRACT**

The present application describes a method for rinsing a splash shield. According to the disclosed method, a vessel containing contents to be mixed is positioned in a mixing machine, and a splash shield is positioned over the opening of the vessel. After the material within the vessel is mixed by a mixing element, the splash shield is separated from the vessel and rinsed by a nozzle on the mixing machine.

In another embodiment, a vessel containing contents to be mixed is positioned in a holder on a mixing machine, and a splash shield (which may or may not be rinseable) is positioned over the opening of the vessel. The contents of the vessel are mixed using a mixing element. During and/or after mixing, opposed relative movement of the mixing element and vessel may occur, creating an upward lifting force on the vessel. The weight of the shield is sufficient to overcome this upward lifting force on the vessel and thereby causes the vessel to remain seated in the holder.

26 Claims, 3 Drawing Sheets



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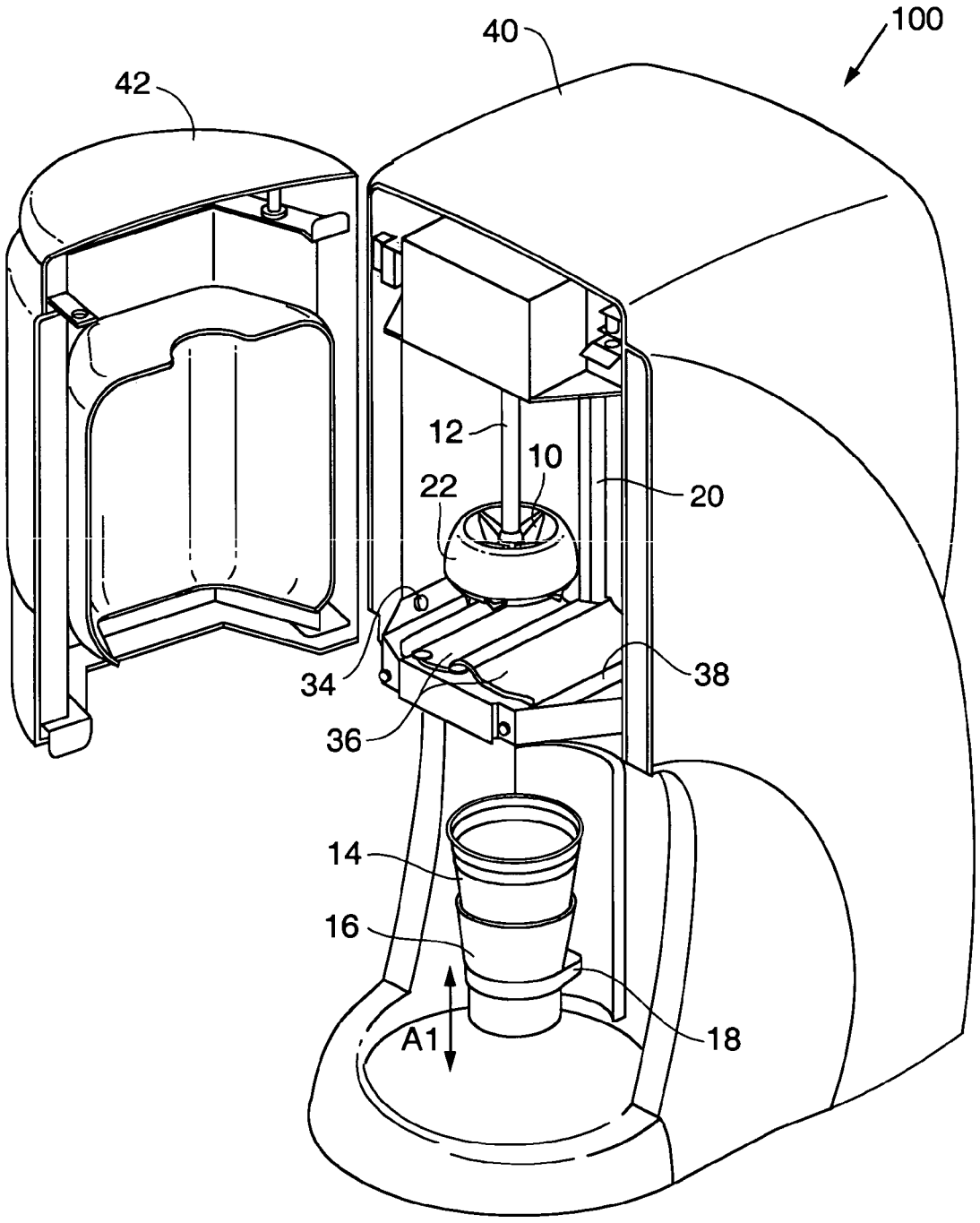

FIG. 1

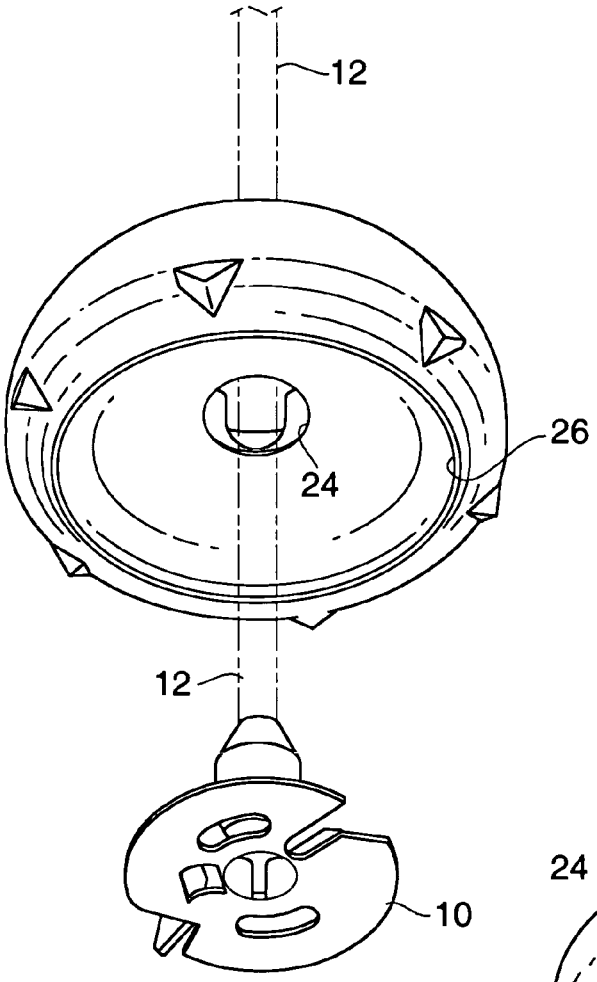

FIG. 2

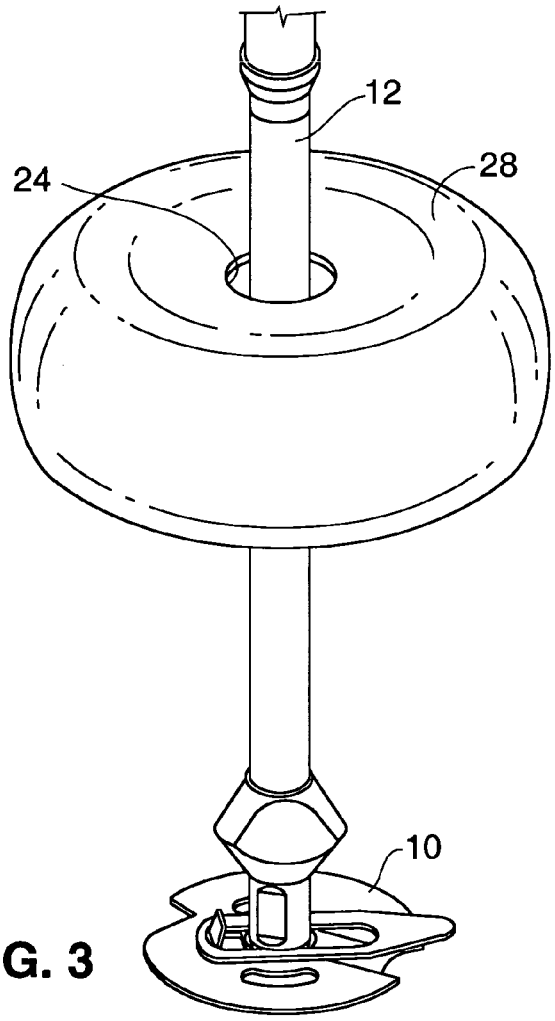

FIG. 3

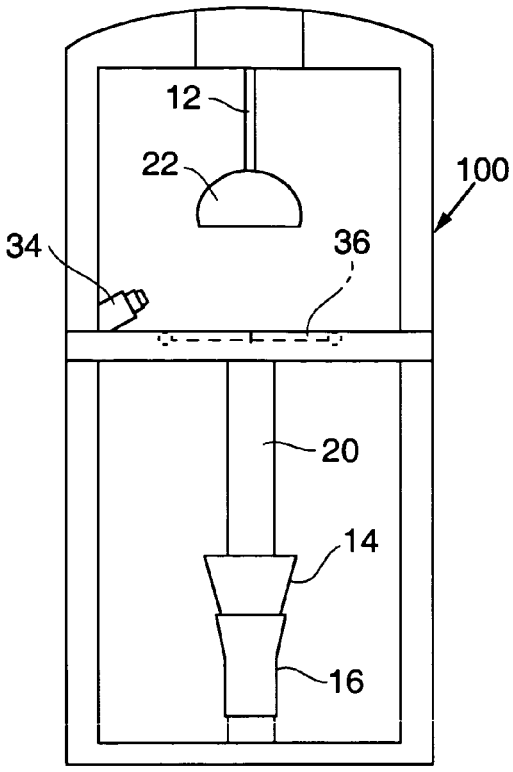

FIG. 4

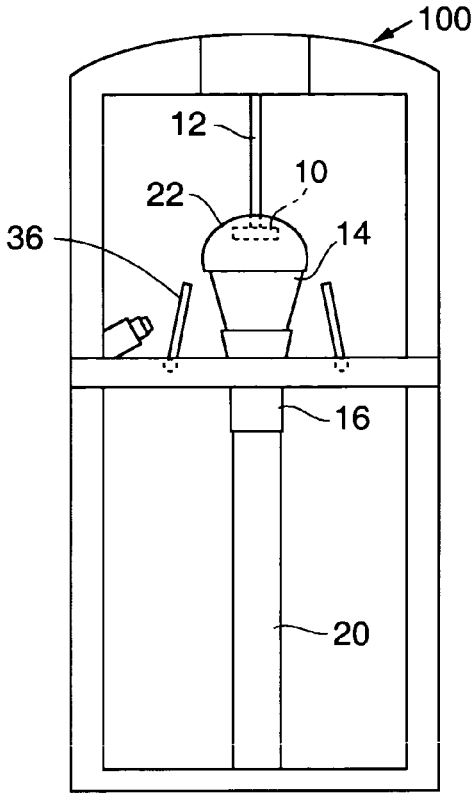

FIG. 5

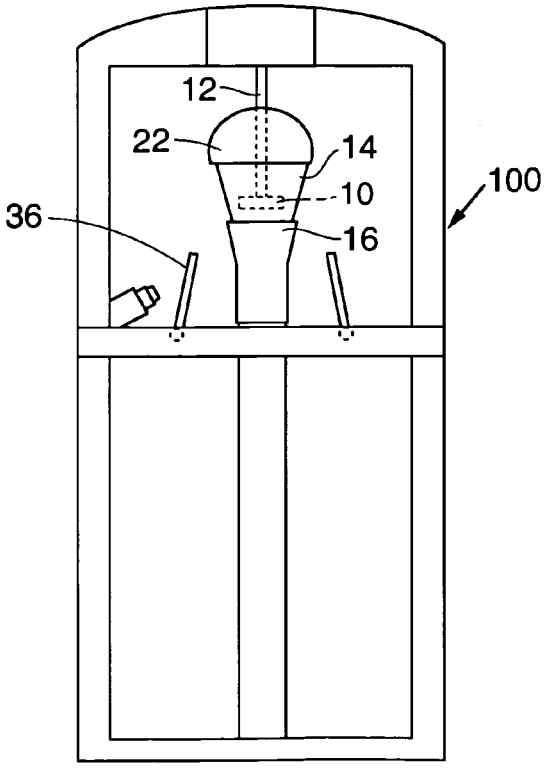

FIG. 6

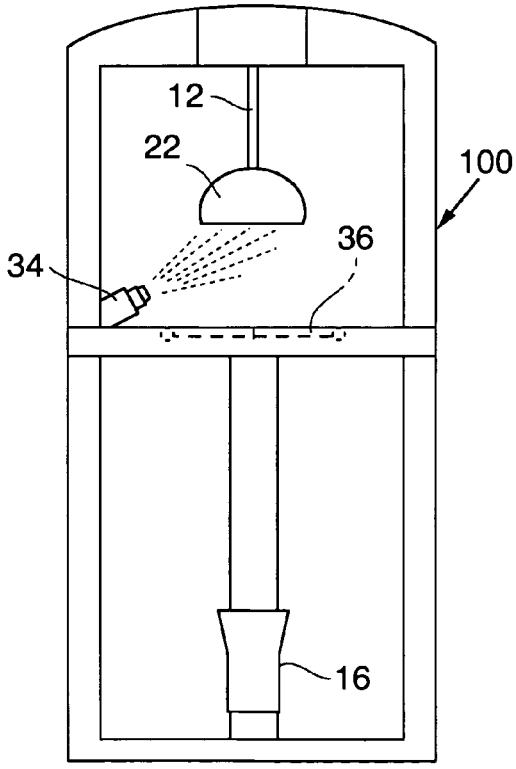

FIG. 7

RINSEABLE SPLASH SHIELD AND METHOD OF USE

PRIORITY

This application claims the benefit of U.S. Provisional Application No. 60/426,622, filed Nov. 15, 2002, and entitled RINSEABLE SPLASH SHIELD.

FIELD OF THE INVENTION

The present invention relates generally to the field of machines for mixing liquids, and specifically to devices for preventing splashing of liquids during mixing.

BACKGROUND OF THE INVENTION

Preparation of certain foods and beverages can involve blending, whipping, stirring, etc. the food or beverage. This may be done using a rotary blade or mixer which is lowered into a container holding the food or beverage, or which is held in place as the container is advanced towards the rotary blade/mixer to move the container's contents into contact with the blade/mixer.

In Applicant's U.S. Pat. Nos. 6,474,862, 6,326,047 and 5,803,377 entitled APPARATUS AND METHOD FOR MAKING FROZEN DRINKS, the disclosures of which are incorporated herein by reference, methods for making frozen drinks are described. These patents describe a machine that allows a milkshake or other frozen drink to be quickly made from a block of ingredients pre-frozen into a serving cup. The frozen contents within the serving cup are broken into small frozen particles using a rotating blade, and blended with an added liquid also using the rotating blade.

According to the patents, when a milkshake or other frozen drink is to be made, a serving cup containing the frozen block is positioned in a cup holder which forms a part of the frozen drink machine. A rotating blade is lowered into the cup and bores through the frozen substance in the cup, grinding it into small frozen particles. As the blade moves towards the bottom interior of the cup, milk, water, or another liquid is added to the cup and is blended into the frozen substance by the rotating blade. Alternatively, the rotating blade may be held at a fixed elevation, and the cup may be advanced towards the blade to move the cup's contents into contact with the blade. In either case, the cup and/or blade may be reciprocated to allow the full contents of the cup to be mixed.

During mixing, material can splash from the cup onto the drink machine and surrounding area. U.S. Pat. Nos 5,328,263 and 5,439,289 (Neilson) each describe a separate, dedicated lid placement mechanism that positions a lid onto a cup so as to minimize such splashing when the contents of the cup are being mixed. U.S. Pat. No. 5,145,250 (Planck) describes a mixing device wherein the lid and mixing device move axially together until the lid makes contact with the receptacle, at which time springs keep the lid in contact with the receptacle as the mixing head travels further into the receptacle. In each case, there is potential for carryover of mixed ingredients from one batch to the next. In Planck, a disposable cover over the pressure plate of the lid is described. In Neilson U.S. Pat. No. 5,439,289 a provision for a releasable lid connector means is claimed to enable cleaning of the lid remotely from the mixing device. It is further desirable, however, to provide a drink mixer having a splash shield that may not only be located on the cup to avoid splashing during mixing, but that may also be automatically rinsed in place following mixing.

SUMMARY OF THE INVENTION

The present application describes a method for rinsing a splash shield. According to the disclosed method, a vessel containing contents to be mixed is positioned in a mixing machine, and a splash shield is positioned over the opening of the vessel. After the material within the vessel is mixed by a mixing element, the splash shield is separated from the vessel and rinsed by a nozzle on the mixing machine.

In another embodiment, a vessel containing contents to be mixed is positioned in a holder on a mixing machine, and a splash shield (which may or may not be rinseable) is positioned over the opening of the vessel. The contents of the vessel are mixed using a mixing element. During and/or after mixing, opposed relative movement of the mixing element and vessel may occur, creating an upward lifting force on the vessel. The weight of the shield is sufficient to overcome this upward lifting force on the vessel and thereby causes the vessel to remain seated in the holder.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a top perspective view of a drink machine having a rinseable splash shield.

FIG. **2** is a bottom perspective view showing a splash shield, shaft and mixing blade of FIG. **1**, with the splash shield displaced from the mixing blade. For clarity, the portion of the shaft passing through the splash shield is not shown.

FIG. **3** is top perspective view of the components shown in FIG. **2**.

FIGS. **4** through **7** are a sequence of front elevation views of the drink machine of FIG. **1** illustrating use of the rinseable splash shield.

DETAILED DESCRIPTION OF THE DRAWINGS

Referring to FIG. **1**, the splash shield disclosed in this application is preferably provided as a component of a mixing/blending machine **100** that uses a rotating blade to mix/blend the contents within a cup or other vessel. Machine **100** may be a machine such as the f'REAL! Self-Serve Milkshake Blender available from f'REAL! Foods LLC, 37 Avenida de Orinda, Orinda, Calif., which is particularly useful for mixing/blending drinks such as frozen milkshakes, coffee drinks, or smoothies. However, it should be appreciated that the rinseable shield may be suitable for use on other types of machines for mixing and/or blending various materials, including powders, slurries and other types of liquids.

Machine **100** includes a mixing blade **10** carried on an elongate shaft **12**. Mixing blade **10** is rotatable by means of a motor (not shown) and is designed to bore through the frozen substance in a cup **14**. As described in greater detail in Applicants U.S. Pat. Nos. 6,474,862, 6,326,047 and 5,803,377, cup **14** is preferably a serving cup within which milkshake or other frozen drink ingredients have been pre-frozen into a block. A cup holder **16** supports the cup and is preferably moveable as indicated by arrow A**1** in FIG. **1**, to cause the mixing blade to blend the frozen drink in the cup. Although movement of the holder **16** can be achieved in various ways, in the FIG. **1** embodiment the cup holder **16** is mounted to a carriage **18** that is moveable along a vertical rail **20** by means of a motor and lead screw assembly (not

shown) disposed within the machine **100**. Mixing blade **10** is rotatable by means of a motor (not shown) and is designed to bore through the frozen substance in the cup. As described in Applicant's prior patents, water, milk or another liquid is added to the cup for blending with the frozen substance, which is broken up into small frozen particles by the boring blade **10**. The added liquid may be directed into the cup from above, such as through a fluid outlet oriented adjacent to the shaft.

As discussed, during mixing, the cup **14** is preferably reciprocated by cup holder **16** as indicated by arrow A1 in FIG. **1**, to cause the rotating blade **10** to pass through the contents of the cup one or more times. Obviously, the blade **10** may include a second motor for moving the shaft **12** longitudinally, in which case the need for the motor associated with cup holder **16** would be eliminated.

Referring to FIGS. **2** and **3**, splash shield **22** is preferably comprised of a lid proportioned to seat along the upper edge of cup **14**. The shield includes an upper opening **24** and a larger lower opening **26**. Shaft **12** extends through the openings **24**, **26** such that the mixing blade **10** is positioned beneath the shield **22**.

Shield **22** may have a dome-shaped configuration as shown, although other configurations would be equally suitable. As shown in FIG. **3**, a wall **28** tapers inwardly from the uppermost surface of the shield **22** down to the upper opening **24**. Spaced apart ribs **30** are positioned along the wall **28** and function to contact a tapered portion **32** of the machine's mixing shaft (as shown in FIG. **1**) when the shield **22** is lowered relative to the shaft. When the shield is raised relative to the shaft, the shield **22** and tapered portion **32** separate as in FIG. **2**.

Referring again to FIG. **1**, one or more nozzles **34** (only one is shown) are provided for directing rinsing fluid into the interior of shield **22**. Nozzles **34** are coupled to one or more sources of rinse fluid, such as water (preferably hot or warm water) and/or sanitizing solution such as a quaternary ammonium sanitizer solution.

Machine **100** includes a pair of automatic hinged doors **36** along the path of travel of holder **16**. A fluid trough **38** for receiving rinse water shed from the shield surrounds the hinged doors. A drain line (not shown) is fluidly coupled to the trough, and the trough includes gradients arranged to direct water towards the drain line. The trough **38**, rinse nozzle **34**, shaft **12**, shield **22** and mixing element are preferably positioned within an enclosure **40** having an access door **42** (as shown in FIG. **1**).

A controller (not shown) within the machine controls operation of the motors for the cup holder, blade and hinged doors, as well as the liquid dispense and rinsing functions.

Operation

FIGS. **4**–**7** are a sequence of drawings that illustrate operation of the rinseable splash shield. First, a cup **14** containing frozen ingredients is positioned in cup holder **16** as shown in FIG. **4** and the user depresses a "start" button (not shown) on the exterior of the machine **100**. Next (FIG. **5**), hinged doors **36** are opened and holder **16** is moved upwardly along rail **20**, thereby moving the upper edge of cup **14** into contact with the shield **22**. Continued upward movement of the holder **16** causes the shield **22** to be raised upwardly on the shaft, and the tapered section **32** of the shaft **12** to separate from ribs **30** of the shield **22**, as the cup **14** moves up around the blade **10**, as shown in FIG. **6**. Rotation of the blade is activated (or may be activated at an earlier stage), and water, milk or other fluid may be directed into the cup as described in Applicant's earlier patents, causing the frozen beverage to be made. During mixing/blending the holder **16** (or the blade) may be reciprocated to allow the blade to pass through the full contents of the cup more than one time.

It should be noted that the shield **22** may be weighted to ensure a good seal with the cup. This eliminates the need for springs, as disclosed in Plank U.S. Pat. No. 5,145,250, or some other mechanism such as those described in Neilson U.S. Pat. Nos. 5,328,263 and 5,439,289, to hold the shield in position during mixing. Weighting the shield is of further advantage if it is heavy enough to create sufficient downward force on the cup to overcome any upward force created by the mixing blade being moved upwardly in the cup. The mixing blade can create such upward force as the mixing blade moves upwardly in the cup, imparting an upward force on the cup as a result of suction force or the viscous nature of the product being mixed in the cup. This can occur when the cup is lowered by the holder during mixing (i.e. when the cup is reciprocated to cause the mixing blade to pass through the cup's contents several times) and/or when the cup is lowered away from the blade after blending/mixing. Making the weight of the shield sufficient to overcome this upward lifting force on the cup causes the cup to remain seated in the cup holder without any other mechanical means of retaining it in the cup holder, such as clamping or gripping mechanisms or the springs or lid placement and retention mechanisms previously described. In one embodiment, the shield may be a cast stainless steel lid having a weight of approximately 5 lbs. It should be noted that a weighted splash shield may be provided even if the rinsing feature is not present.

Once the beverage is made, the cup holder **16** is lowered and thereby moves the cup **14** downwardly away from the blade. The descending cup carries the shield **22** downwardly until the ribs **30** of the shield engage tapered portion **32** of the shaft **12**. At this point, the cup **14** separates from the shield **22** and is moved by the holder **16** to the position shown in FIG. **4**. The cup may then be removed from the drink machine **100**.

Next, the hinged doors **36** are closed and rinse fluid is directed onto the shield **22** using nozzle **34** as shown in FIG. **7**. If desired, the shaft **12** may be rotated during and after rinsing. Given the weight of the splash shield and the contact between ribs **30** and tapered section **32** on the shaft, rotating the shaft **12** rotates the splash shield as well, thus allowing the rinse water to be spun off of the shield. Rotation may be of particular advantage if a single nozzle **34** is used for rinsing, since it allows the full interior of the shield **22** to be exposed to the fluid spray from the nozzle. The shield, blade and closed doors **36** shed the rinse fluid into trough **38**, which then directs the water out of the machine via the drain line.

I claim:

1. A method for rinsing a splash shield on a mixing machine, the method comprising the steps of:

providing a vessel containing contents to be mixed, the vessel including an opening;

further providing a mixing machine having a holder for receiving the vessel at an access location in the mixing machine, a rotatable mixing element extendable into the vessel for mixing the contents of the vessel, a splash shield positionable over the opening of the vessel, and a nozzle oriented towards the splash shield;

after mixing the contents of the vessel using the mixing element and with the splash shield covering the opening, separating the splash shield and the vessel; and

directing rinsing fluid onto the splash shield using the nozzle while shielding the access location from the rinsing fluid.

2. The method of claim 1, wherein the directing step is performed automatically after the separating step.

3. The method of claim 1, wherein the holder is moveable from the access location in a first direction towards the splash shield and a second direction away from the splash shield to the access location and wherein the separating step includes the step of moving the holder in the second direction.

4. The method of claim 3, wherein:

the mixing element is on a shaft;

the splash shield is engageable with a member on the shaft, the splash shield disengageable from the member in response to upward force against the shield, and

mixing is carried out with the splash shield disengaged from the member;

the step of moving the holder in the second direction separates the vessel and splash shield and causes the splash shield to engage with the member on the shaft; and

the method further includes the step of rotating the shaft to rotate the splash shield during the directing step.

5. The method of claim 1, further including the step of rotating the splash shield during the directing step.

6. The method of claim 1, wherein the directing step directs warm water.

7. The method of claim 1, further including the step of directing rinsing fluid onto the mixing element.

8. The method of claim 1, wherein the method includes the steps of:

with the mixing element in the contents of the vessel, causing relative movement of the mixing element and vessel in opposite directions, and

causing the splash shield to retain the vessel within the holder during relative movement of the mixing element and vessel in opposite directions.

9. The method of claim 8, wherein in the causing step the mass of the splash shield retains the vessel within the holder.

10. The method of claim 1, wherein the directing step directs a rinse solution comprising sanitizing solution.

11. The method of claim 10, wherein the sanitizing solution includes a quaternary ammonium sanitizer solution.

12. The method of claim 1 wherein:

the mixing machine further includes a rinse chamber having an entrance and a door,

during the rinsing step the splash shield is positioned within the rinse chamber; and

wherein the shielding step includes moving the door to a closed position to enclose the splash shield within the rinse chamber.

13. The method of claim 12 wherein the door defines a flow path and wherein the method includes causing rinse water falling from the splash shield to flow along the flow path to a drain.

14. The method of claim 12 wherein the separating step includes the step of moving the holder in a first direction to move the opening of the vessel from a first position within the rinse chamber to a second position at the access location.

15. On a mixing machine for mixing a liquid contained in a vessel having an opening, the mixing machine of a type including a rotatable mixing element extendable into the vessel for mixing the contents of the vessel, the improvement comprising:

a rinse chamber in the mixing machine, the rinse chamber having an entrance and a door moveable to a closed position covering the entrance;

a splash shield carried by the mixing machine, the splash shield positionable covering the opening of the vessel, and

at least one nozzle coupled to a source of rinse fluid and oriented to direct rinse fluid onto the splash shield within the rinse chamber.

16. The improvement of claim 15, wherein the mixing machine is further of the type wherein the mixing element is carried by a shaft, and wherein in the improvement the splash shield is carried by the shaft.

17. The improvement of claim 16, wherein the improvement further includes means for moving the holder in a first direction towards the splash shield to move the vessel into contact with the splash shield and in a second direction away from the splash shield to separate the vessel from the splash shield.

18. The improvement of claim 17, wherein the splash shield is engageable with a member on the shaft and is disengageable from the member in response to upward force by the vessel against the splash shield.

19. The improvement of claim 18, wherein the shaft is rotatable to rotate the splash shield as rinse fluid is directed onto the splash shield by the nozzle.

20. The improvement of claim 15, wherein the at least one nozzle is oriented to direct rinse fluid onto the mixing element.

21. The improvement of claim 17, wherein the splash shield is of sufficient mass to remain in position covering the opening of the vessel during movement of the holder in the second direction until it engages with the member.

22. The improvement of claim 15, wherein the splash shield is of sufficient mass to retain the vessel within the holder during relative movement of the mixing element and vessel in opposite directions.

23. The improvement of claim 15, wherein:

the improvement further includes a holder proportioned to receive the vessel and moveable in a first direction to carry at least the opening of the vessel through the entrance into the rinse chamber and into contact with the splash shield, and moveable in a second direction to separate the opening of the vessel from the splash shield.

24. On a mixing machine of a type having a rotatable mixing element extendable into a vessel for mixing the contents of the vessel, the improvement comprising:

a splash shield carried by the mixing machine, the splash shield positionable to shield the opening of the vessel,

a source of rinse fluid;

at least one nozzle coupled to the source of rinse fluid and oriented to direct rinse fluid onto the splash shield; and

an access location in the mixing machine, the vessel positionable at the access location in preparation for mixing of the vessel contents and retrievable from the access location following mixing; and

a barrier moveably positioned to shield the access location from rinse fluid.

25. The improvement of claim 24, wherein the source of rinse fluid comprises sanitizing solution.

26. The improvement of claim 25, wherein the sanitizing solution includes a quaternary ammonium sanitizer solution.

* * * * *

EXHIBIT 3

US007520658B2

(12) **United States Patent**
Farrell

(10) **Patent No.: US 7,520,658 B2**
(45) **Date of Patent: Apr. 21, 2009**

(54) **RINSEABLE SPLASH SHIELD AND METHOD OF USE**

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(73) Assignee: **f'REAL! Foods, LLC**, Orinda, CA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **11/284,646**

(22) Filed: **Nov. 22, 2005**

(65) **Prior Publication Data**

US 2006/0077756 A1 Apr. 13, 2006

Related U.S. Application Data

(62) Division of application No. 10/715,171, filed on Nov. 17, 2003.

(60) Provisional application No. 60/426,622, filed on Nov. 15, 2002.

(51) **Int. Cl.**
B01F 13/00 (2006.01)
B01F 15/00 (2006.01)

(52) **U.S. Cl.** **366/197**; 366/203; 366/207; 366/347

(58) **Field of Classification Search** 366/203, 366/207, 199, 197, 347
See application file for complete search history.

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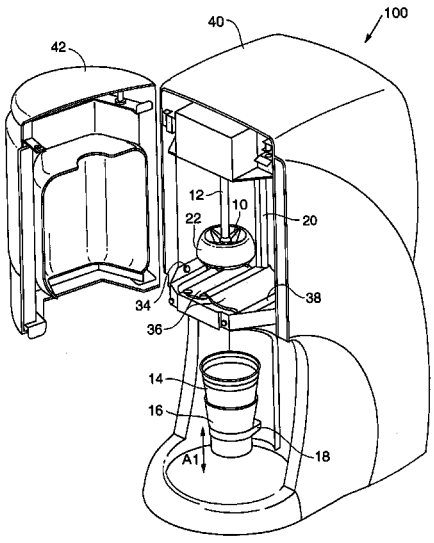
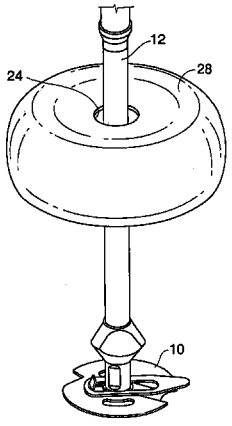
(74) *Attorney, Agent, or Firm*—Stallman & Pollock

(57) **ABSTRACT**

The present application describes a method for rinsing a splash shield. A vessel containing contents to be mixed is positioned in a mixing machine, and a splash shield is positioned over the opening of the vessel. After the material within the vessel is mixed by a mixing element, the splash shield is separated from the vessel and rinsed by a nozzle on the mixing machine. In another embodiment, a vessel containing contents to be mixed is positioned in a holder on a mixing machine, and a splash shield (which may or may not be rinseable) is positioned over the opening of the vessel. The contents of the vessel are mixed using a mixing element. During and/or after mixing, opposed relative movement of the mixing element and vessel may occur, creating an upward lifting force on the vessel. The weight of the shield is sufficient to overcome this upward lifting force on the vessel and thereby causes the vessel to remain seated in the holder.

11 Claims, 3 Drawing Sheets





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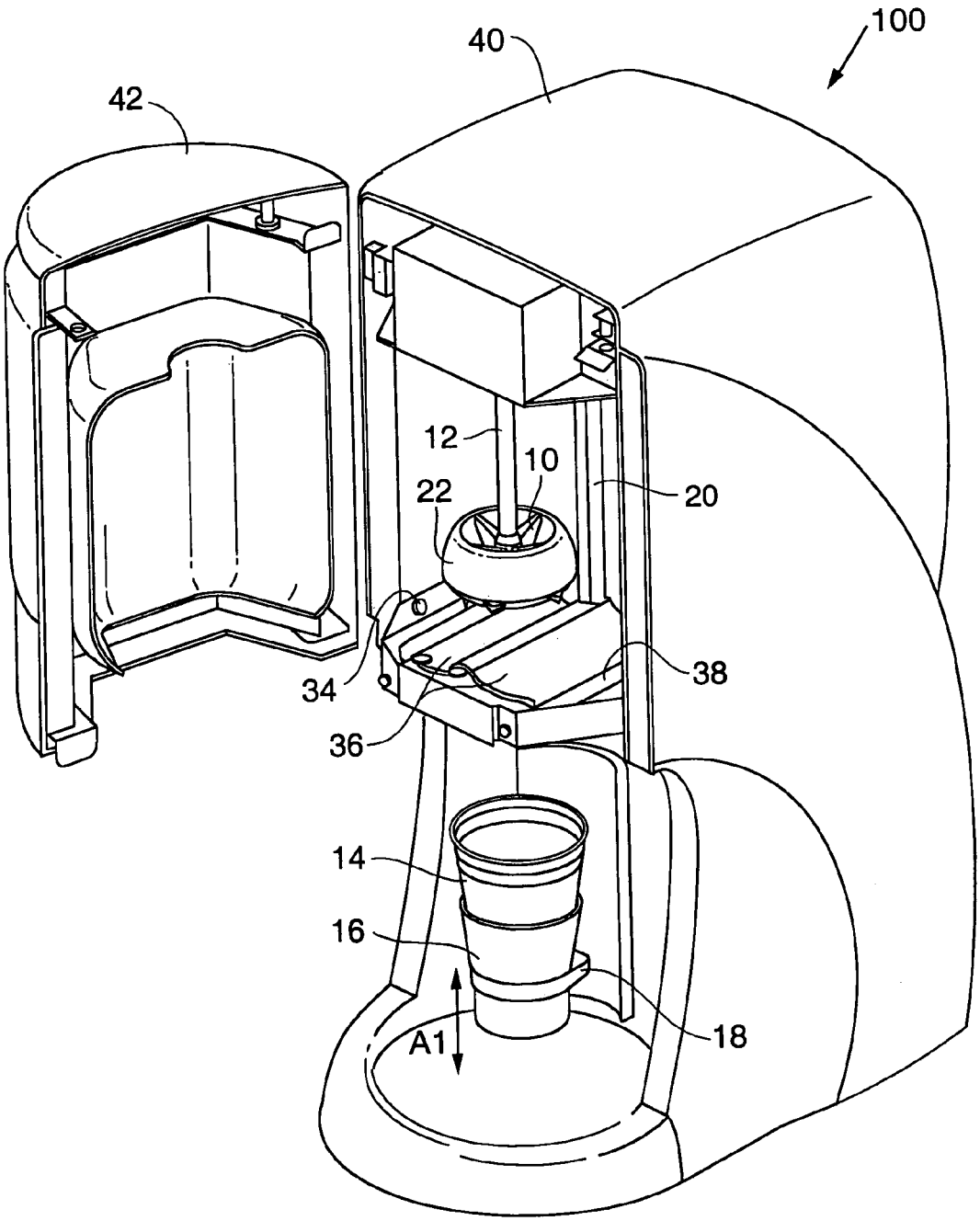

FIG. 1

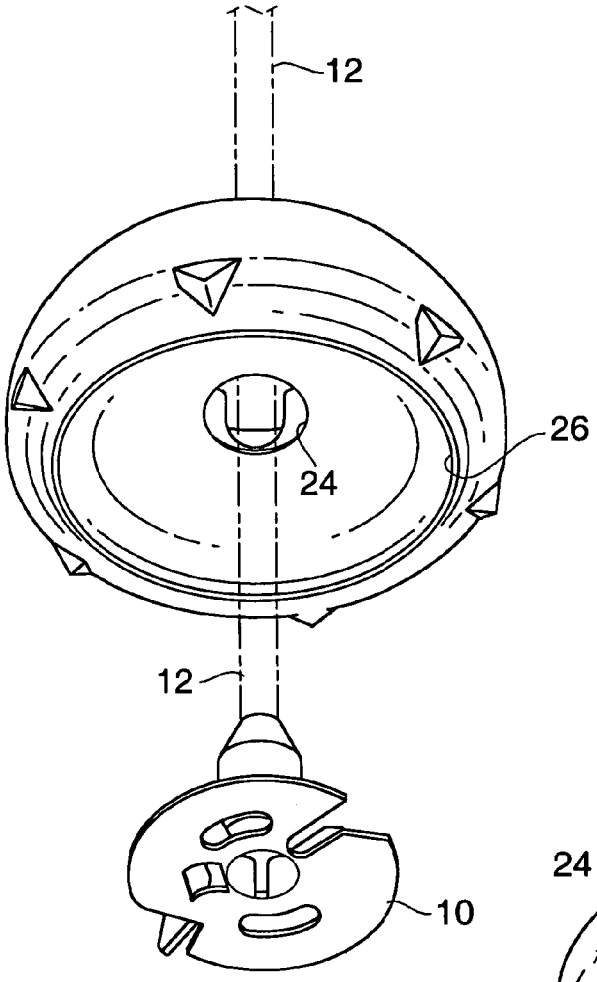

FIG. 2

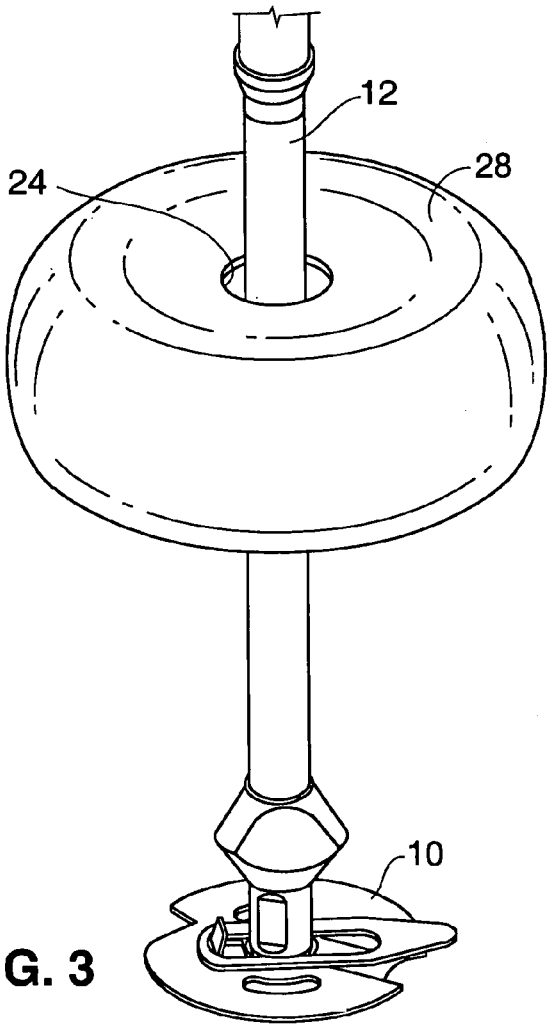

FIG. 3

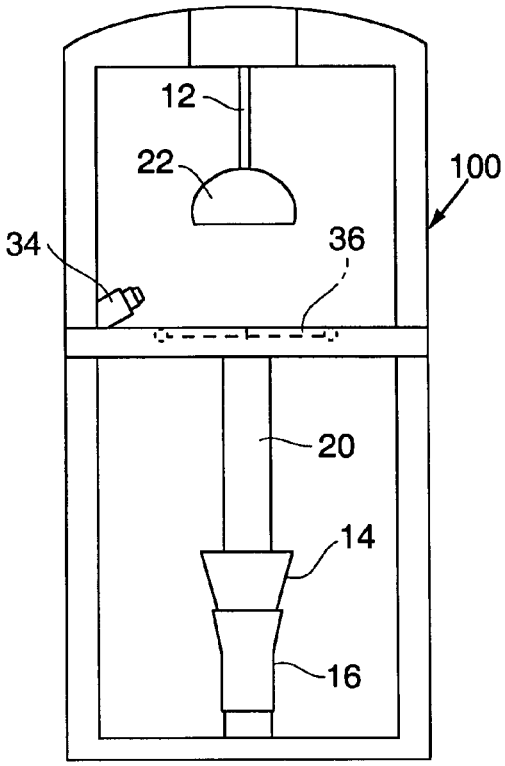

FIG. 4

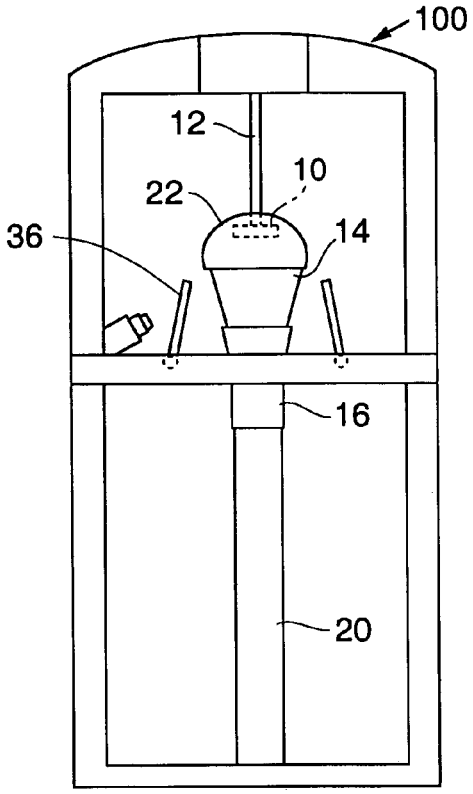

FIG. 5

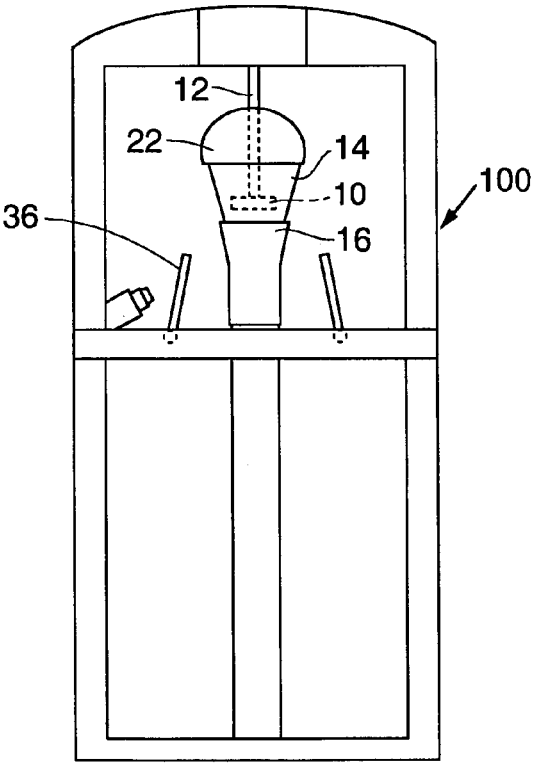

FIG. 6

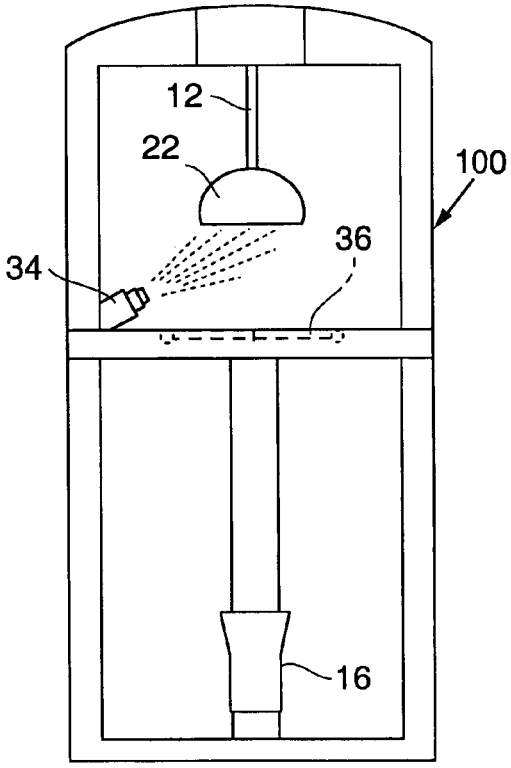

FIG. 7

RINSEABLE SPLASH SHIELD AND METHOD OF USE

PRIORITY

This application is a Divisional of U.S. patent application Ser. No. 10/715,171, filed Nov. 17, 2003, and claims the benefit of U.S. Provisional Application No. 60/426,622, filed Nov. 15, 2002.

FIELD OF THE INVENTION

The present invention relates generally to the field of machines for mixing liquids, and specifically to devices for preventing splashing of liquids during mixing.

BACKGROUND OF THE INVENTION

Preparation of certain foods and beverages can involve blending, whipping, stirring, etc. the food or beverage. This may be done using a rotary blade or mixer which is lowered into a container holding the food or beverage, or which is held in place as the container is advanced towards the rotary blade/mixer to move the container's contents into contact with the blade/mixer.

In Applicant's U.S. Pat. Nos. 6,474,862, 6,326,047 and 5,803,377 entitled APPARATUS AND METHOD FOR MAKING FROZEN DRINKS, the disclosures of which are incorporated herein by reference, methods for making frozen drinks are described. These patents describe a machine that allows a milkshake or other frozen drink to be quickly made from a block of ingredients pre-frozen into a serving cup. The frozen contents within the serving cup are broken into small frozen particles using a rotating blade, and blended with an added liquid also using the rotating blade.

According to the patents, when a milkshake or other frozen drink is to be made, a serving cup containing the frozen block is positioned in a cup holder which forms a part of the frozen drink machine. A rotating blade is lowered into the cup and bores through the frozen substance in the cup, grinding it into small frozen particles. As the blade moves towards the bottom interior of the cup, milk, water, or another liquid is added to the cup and is blended into the frozen substance by the rotating blade. Alternatively, the rotating blade may be held at a fixed elevation, and the cup may be advanced towards the blade to move the cup's contents into contact with the blade. In either case, the cup and/or blade may be reciprocated to allow the full contents of the cup to be mixed.

During mixing, material can splash from the cup onto the drink machine and surrounding area. U.S. Pat. Nos. 5,328,263 and 5,439,289 (Neilson) each describe a separate, dedicated lid placement mechanism that positions a lid onto a cup so as to minimize such splashing when the contents of the cup are being mixed. U.S. Pat. No. 5,145,250 (Planck) describes a mixing device wherein the lid and mixing device move axially together until the lid makes contact with the receptacle, at which time springs keep the lid in contact with the receptacle as the mixing head travels further into the receptacle. In each case, there is potential for carryover of mixed ingredients from one batch to the next. In Planck, a disposable cover over the pressure plate of the lid is described. In Neilson U.S. Pat. No. 5,439,289 a provision for a releasable lid connector means is claimed to enable cleaning of the lid remotely from the mixing device. It is further desirable, however, to provide a drink mixer having a splash shield that may not only be located on the cup to avoid splashing during mixing, but that may also be automatically rinsed in place following mixing.

SUMMARY OF THE INVENTION

The present application describes a method for rinsing a splash shield. According to the disclosed method, a vessel containing contents to be mixed is positioned in a mixing machine, and a splash shield is positioned over the opening of the vessel. After the material within the vessel is mixed by a mixing element, the splash shield is separated from the vessel and rinsed by a nozzle on the mixing machine.

In another embodiment, a vessel containing contents to be mixed is positioned in a holder on a mixing machine, and a splash shield (which may or may not be rinseable) is positioned over the opening of the vessel. The contents of the vessel are mixed using a mixing element. During and/or after mixing, opposed relative movement of the mixing element and vessel may occur, creating an upward lifting force on the vessel. The weight of the shield is sufficient to overcome this upward lifting force on the vessel and thereby causes the vessel to remain seated in the holder

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a top perspective view of a drink machine having a rinseable splash shield.

FIG. **2** is a bottom perspective view showing a splash shield, shaft and mixing blade of FIG. **1**, with the splash shield displaced from the mixing blade. For clarity, the portion of the shaft passing through the splash shield is not shown.

FIG. **3** is top perspective view of the components shown in FIG. **2**.

FIGS. **4** through **7** are a sequence of front elevation views of the drink machine of FIG. **1** illustrating use of the rinseable splash shield.

DETAILED DESCRIPTION OF THE DRAWINGS

Referring to FIG. **1**, the splash shield disclosed in this application is preferably provided as a component of a mixing/blending machine **100** that uses a rotating blade to mix/blend the contents within a cup or other vessel. Machine **100** may be a machine such as the f'REAL! Self-Serve Milkshake Blender available from f'REAL! Foods LLC, 37 Avenida de Orinda, Orinda, Calif., which is particularly useful for mixing/blending drinks such as frozen milkshakes, coffee drinks, or smoothies. However, it should be appreciated that the rinseable shield may be suitable for use on other types of machines for mixing and/or blending various materials, including powders, slurries and other types of liquids.

Machine **100** includes a mixing blade **10** carried on an elongate shaft **12**. Mixing blade **10** is rotatable by means of a motor (not shown) and is designed to bore through the frozen substance in a cup **14**. As described in greater detail in Applicants U.S. Pat. Nos. 6,474,862, 6,326,047 and 5,803,377, cup **14** is preferably a serving cup within which milkshake or other frozen drink ingredients have been pre-frozen into a block. A cup holder **16** supports the cup and is preferably moveable as indicated by arrow Al in FIG. **1**, to cause the mixing blade to blend the frozen drink in the cup. Although movement of the holder **16** can be achieved in various ways, in the FIG. **1** embodiment the cup holder **16** is mounted to a carriage **18** that is moveable along a vertical rail **20** by means of a motor and lead screw assembly (not shown) disposed within the machine **100**. Mixing blade **10** is rotatable by means of a motor (not shown) and is designed to bore through the frozen substance in the cup. As described in Applicant's prior patents, water, milk or another liquid is added to the cup

for blending with the frozen substance, which is broken up into small frozen particles by the boring blade **10**. The added liquid may be directed into the cup from above, such as through a fluid outlet oriented adjacent to the shaft.

As discussed, during mixing, the cup **14** is preferably reciprocated by cup holder **16** as indicated by arrow Al in FIG. **1**, to cause the rotating blade **10** to pass through the contents of the cup one or more times Obviously, the blade **10** may include a second motor for moving the shaft **12** longitudinally, in which case the need for the motor associated with cup holder **16** would be eliminated.

Referring to FIGS. **2** and **3**, splash shield **22** is preferably comprised of a lid proportioned to seat along the upper edge of cup **14**. The shield includes an upper opening **24** and a larger lower opening **26**. Shaft **12** extends through the openings **24**, **26** such that the mixing blade **10** is positioned beneath the shield **22**.

Shield **22** may have a dome-shaped configuration as shown, although other configurations would be equally suitable. As shown in FIG. **3**, a wall **28** tapers inwardly from the uppermost surface of the shield **22** down to the upper opening **24**. Spaced apart ribs **30** are positioned along the wall **28** and function to contact a tapered portion **32** of the machine's mixing shaft (as shown in FIG. **1**) when the shield **22** is lowered relative to the shaft. When the shield is raised relative to the shaft, the shield **22** and tapered portion **32** separate as in FIG. **2**.

Referring again to FIG. **1**, one or more nozzles **34** (only one is shown) are provided for directing rinsing fluid into the interior of shield **22**. Nozzles **34** are coupled to one or more sources of rinse fluid, such as water (preferably hot or warm water) and/or sanitizing solution such as a quaternary ammonium sanitizer solution.

Machine **100** includes a pair of automatic hinged doors **36** along the path of travel of holder **16**. A fluid trough **38** for receiving rinse water shed from the shield surrounds the hinged doors. A drain line (not shown) is fluidly coupled to the trough, and the trough includes gradients arranged to direct water towards the drain line. The trough **38**, rinse nozzle **34**, shaft **12**, shield **22** and mixing element are preferably positioned within an enclosure **40** having an access door **42** (as shown in FIG. **1**).

A controller (not shown) within the machine controls operation of the motors for the cup holder, blade and hinged doors, as well as the liquid dispense and rinsing functions.

Operation

FIGS. **4-7** are a sequence of drawings that illustrate operation of the rinseable splash shield. First, a cup **14** containing frozen ingredients is positioned in cup holder **16** as shown in FIG. **4** and the user depresses a "start" button (not shown) on the exterior of the machine **100**. Next (FIG. **5**), hinged doors **36** are opened and holder **16** is moved upwardly along rail **20**, thereby moving the upper edge of cup **14** into contact with the shield **22**. Continued upward movement of the holder **16** causes the shield **22** to be raised upwardly on the shaft, and the tapered section **32** of the shaft **12** to separate from ribs **30** of the shield **22**, as the cup **14** moves up around the blade **10**, as shown in FIG. **6**. Rotation of the blade is activated (or may be activated at an earlier stage), and water, milk or other fluid may be directed into the cup as described in Applicant's earlier patents, causing the frozen beverage to be made. During mixing/blending the holder **16** (or the blade) may be reciprocated to allow the blade to pass through the full contents of the cup more than one time.

It should be noted that the shield **22** may be weighted to ensure a good seal with the cup. This eliminates the need for springs, as disclosed in Plank U.S. Pat. No. 5,145,250, or some other mechanism such as those described in Neilson U.S. Pat. Nos. 5,328,263 and 5,439,289, to hold the shield in position during mixing. Weighting the shield is of further advantage if it is heavy enough to create sufficient downward force on the cup to overcome any upward force created by the mixing blade being moved upwardly in the cup. The mixing blade can create such upward force as the mixing blade moves upwardly in the cup, imparting an upward force on the cup as a result of suction force or the viscous nature of the product being mixed in the cup. This can occur when the cup is lowered by the holder during mixing (i.e. when the cup is reciprocated to cause the mixing blade to pass through the cup's contents several times) and/or when the cup is lowered away from the blade after blending/mixing. Making the weight of the shield sufficient to overcome this upward lifting force on the cup causes the cup to remain seated in the cup holder without any other mechanical means of retaining it in the cup holder, such as clamping or gripping mechanisms or the springs or lid placement and retention mechanisms previously described. In one embodiment, the shield may be a cast stainless steel lid having a weight of approximately 5 lbs. It should be noted that a weighted splash shield may be provided even if the rinsing feature is not present.

Once the beverage is made, the cup holder **16** is lowered and thereby moves the cup **14** downwardly away from the blade. The descending cup carries the shield **22** downwardly until the ribs **30** of the shield engage tapered portion **32** of the shaft **12**. At this point, the cup **14** separates from the shield **22** and is moved by the holder **16** to the position shown in FIG. **4**. The cup may then be removed from the drink machine **100**.

Next, the hinged doors **36** are closed and rinse fluid is directed onto the shield **22** using nozzle **34** as shown in FIG. **7**. If desired, the shaft **12** may be rotated during and after rinsing. Given the weight of the splash shield and the contact between ribs **30** and tapered section **32** on the shaft, rotating the shaft **12** rotates the splash shield as well, thus allowing the rinse water to be spun off of the shield. Rotation may be of particular advantage if a single nozzle **34** is used for rinsing, since it allows the full interior of the shield **22** to be exposed to the fluid spray from the nozzle. The shield, blade and closed doors **36** shed the rinse fluid into trough **38**, which then directs the water out of the machine via the drain line.

I claim:

1. A mixing machine for mixing a liquid contained in a vessel having an opening, the mixing machine comprising:

a holder coupled to the mixing machine, the holder proportioned to receive a vessel;

a rotatable mixing element extendable through the opening into the vessel positioned in the holder, for mixing the contents of the vessel;

a motor operatively coupled to at least one of the holder and the mixing element to effect axial translation of the mixing element between first and second positions within the vessel, the mixing element positioned further from the opening when in the first position than when in the second position;

a shaft; and

a splash shield slidable on the shaft between first and second positions, the splash shield in the second position positionable covering the opening of the vessel and being unrestrained against sliding movement on the shaft in a direction away from the opening, the splash shield having sufficient mass to retain the vessel within the holder during relative axial movement of the mixing element and vessel from the first position to the second position when liquid is present in the vessel.

2. The mixing machine of claim **1**, wherein the mixing element is carried on the shaft, and wherein the holder is moveable relative to the mixing element to move the vessel in a first direction towards the mixing element and in a second direction away from the mixing element.

3. The mixing machine of claim **2**, wherein movement of the vessel in the first direction positions the vessel in contact with the splash shield.

4. The mixing machine of claim **1**, wherein the mixing element is carried by the shaft, and wherein the splash shield is engageable with a member on the shaft and is disengageable from the member in response to upward force by the vessel against the splash shield.

5. The mixing machine of claim **1**, wherein the splash shield has a mass of approximately 5 lbs.

6. A method for retaining a vessel in a holder while mixing contents of the vessel, the method comprising the steps of:

providing a vessel containing contents to be mixed, the vessel including an opening;

further providing a mixing machine having a holder on the mixing machine for receiving the vessel, a rotatable mixing element extendable into the vessel for mixing the contents of the vessel, and a shield;

positioning the vessel in the holder;

positioning the shield in contact with the vessel to cover the opening of the vessel, the shield when contacting the vessel being unrestrained against upward movement away from the opening; and

with the vessel positioned in the holder, using a motor to translate at least one of the mixing element and the holder such that the mixing element passes through the contents of the vessel, the mass of the splash shield preventing separation of the holder and the vessel during translation.

7. The method of claim **6**, wherein the method further includes the step of rotating the mixing element to mix the contents of the vessel.

8. The method of claim **7** wherein translating the mixing element includes translating the mixing element while rotating the mixing element to mix the contents of the vessel.

9. The method of claim **6**, wherein the method further includes containing a substantial portion of contents splashing from the vessel within the shield or vessel.

10. The method of claim **6**, wherein the contents of the vessel are at least partially frozen.

11. The method of claim **6**, wherein the contents comprise frozen milkshake ingredients.

* * * * *

EXHIBIT 4

US007520662B2

(12) **United States Patent**
Farrell

(10) **Patent No.: US 7,520,662 B2**
(45) **Date of Patent: *Apr. 21, 2009**

(54) **RINSEABLE SPLASH SHIELD AND METHOD OF USE**

(75) Inventor: **James J. Farrell**, Orinda, CA (US)

(73) Assignee: **f'REAL? Foods, LLC**, Orinda, CA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 479 days.

This patent is subject to a terminal disclaimer.

(21) Appl. No.: **11/116,497**

(22) Filed: **Apr. 28, 2005**

(65) **Prior Publication Data**

US 2005/0201198 A1 Sep. 15, 2005

Related U.S. Application Data

(63) Continuation-in-part of application No. 10/715,171, filed on Nov. 17, 2003, now Pat. No. 7,144,150.

(60) Provisional application No. 60/426,622, filed on Nov. 15, 2002.

(51) **Int. Cl.**
B01F 15/00 (2006.01)
B08B 3/02 (2006.01)

(52) **U.S. Cl.** ..... **366/347**; 366/348; 366/349; 134/115 R

(58) **Field of Classification Search** ..... 366/347, 366/348, 349; 134/115 R
See application file for complete search history.

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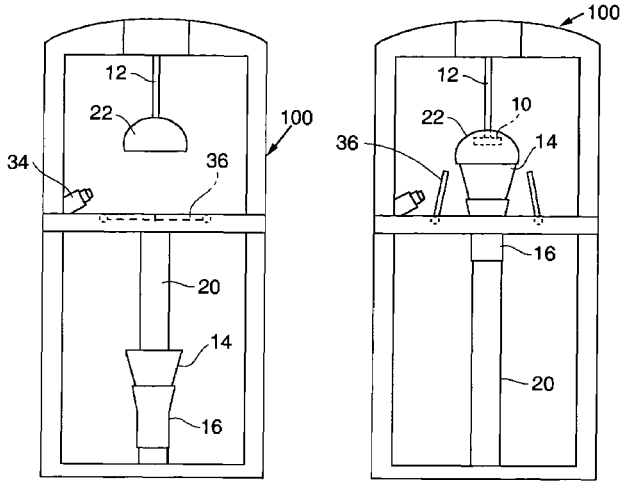
Primary Examiner—Tony G Soohoo
(74) *Attorney, Agent, or Firm*—Stallman & Pollock

(57) **ABSTRACT**

The present application describes a method for rinsing a splash shield with water or a sanitizing solution. According to the disclosed method, a vessel containing contents to be mixed is positioned in a mixing machine, and a splash shield is positioned to shield the opening of the vessel. After the material within the vessel is mixed by a mixing element, the splash shield is separated from the vessel and rinsed by a nozzle on the mixing machine.

In another embodiment, a vessel containing contents to be mixed is positioned in a holder on a mixing machine, and a splash shield (which may or may not be rinseable) is positioned over the opening of the vessel. The contents of the vessel are mixed using a mixing element. During and/or after mixing, opposed relative movement of the mixing element and vessel may occur, creating an upward lifting force on the vessel. The weight of the shield is sufficient to overcome this upward lifting force on the vessel and thereby causes the vessel to remain seated in the holder.

22 Claims, 5 Drawing Sheets



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6,326,047	B1	12/2001	Farrell	426/524
6,453,803	B1	9/2002	Sodeyama et al.	99/348
6,474,862	B2	11/2002	Farrell	366/147
7,144,150	B2 *	12/2006	Farrell	366/197

* cited by examiner

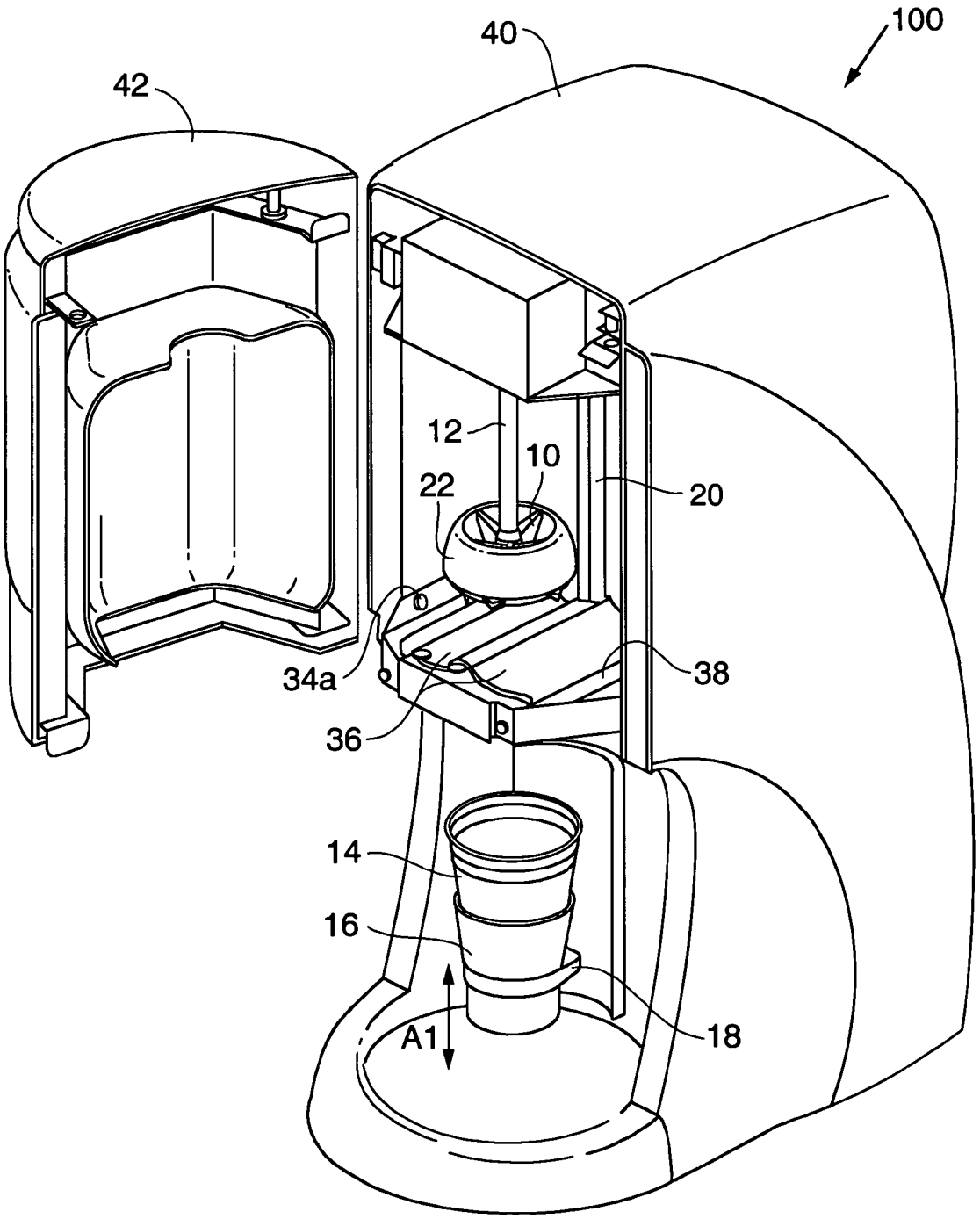

FIG. 1A

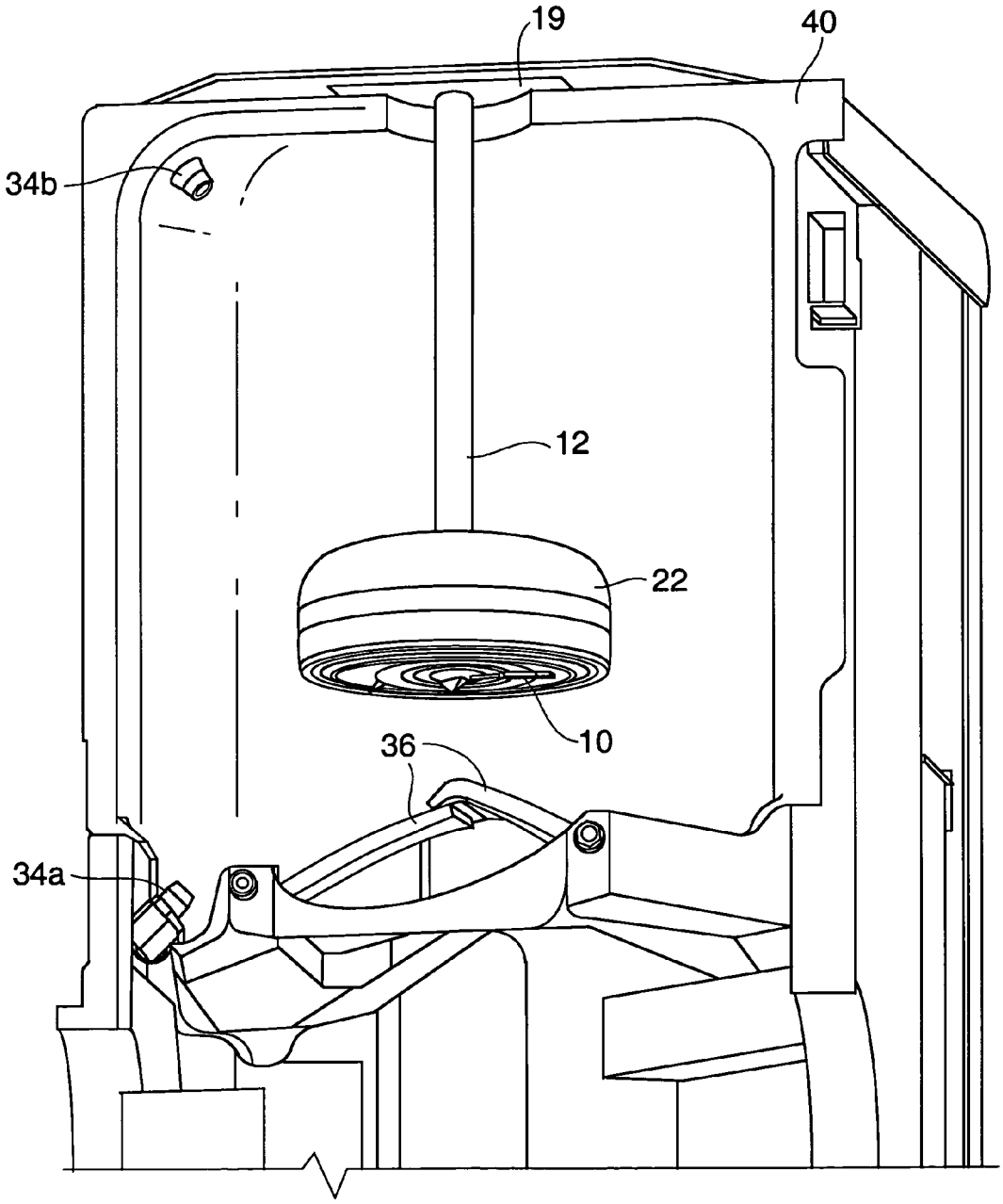

FIG. 1B

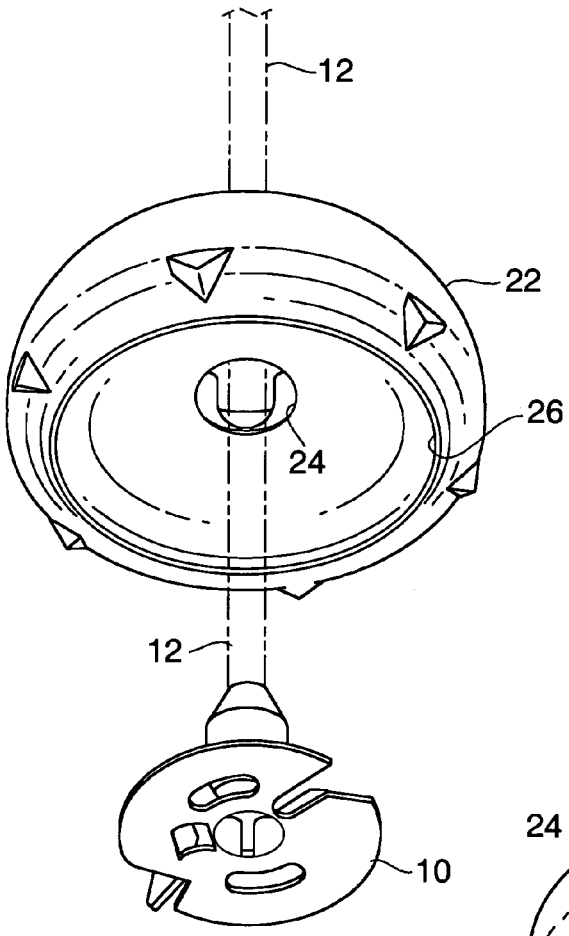

FIG. 2A

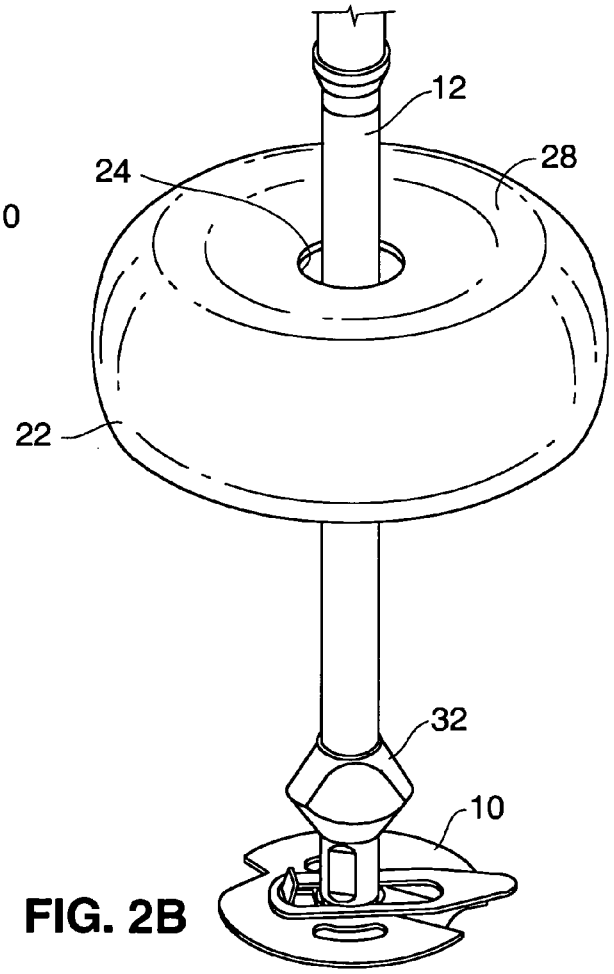

FIG. 2B

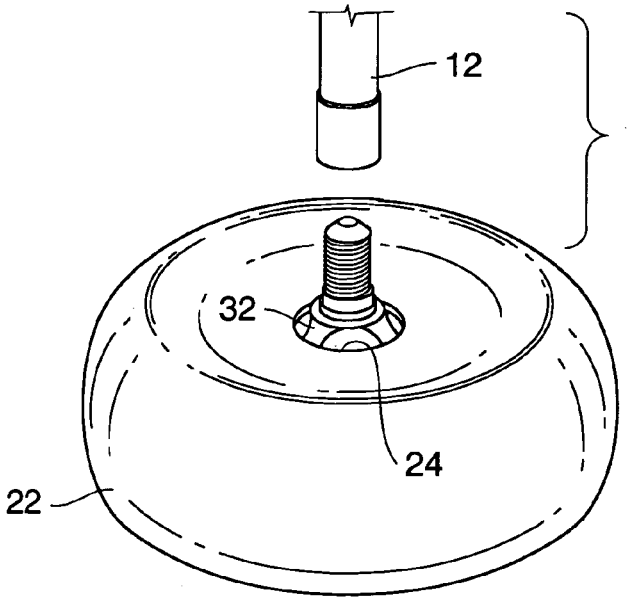

FIG. 2C

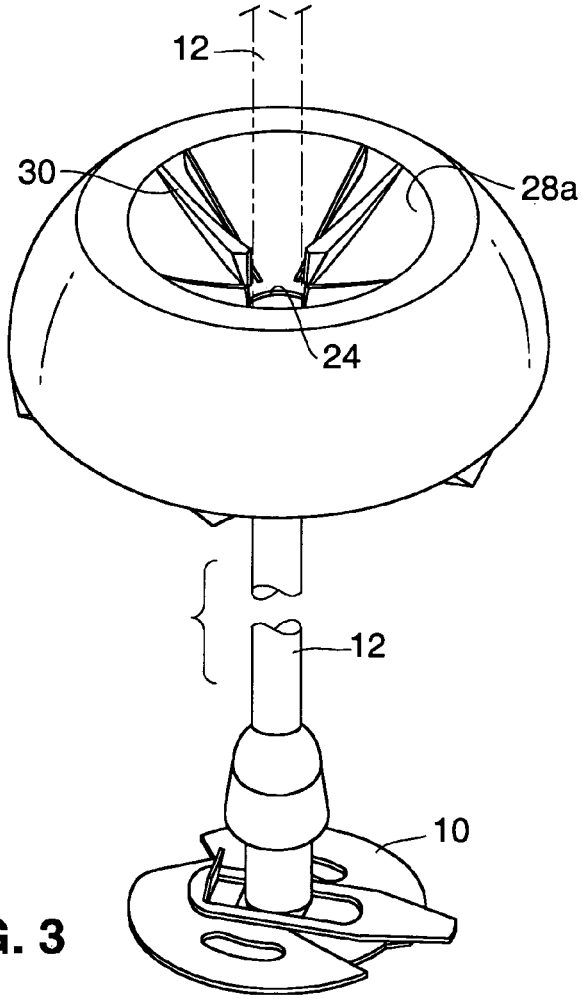

FIG. 3

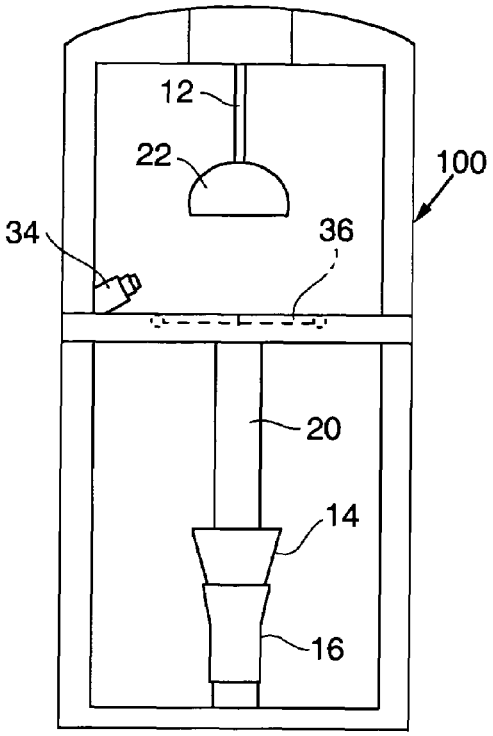

FIG. 4

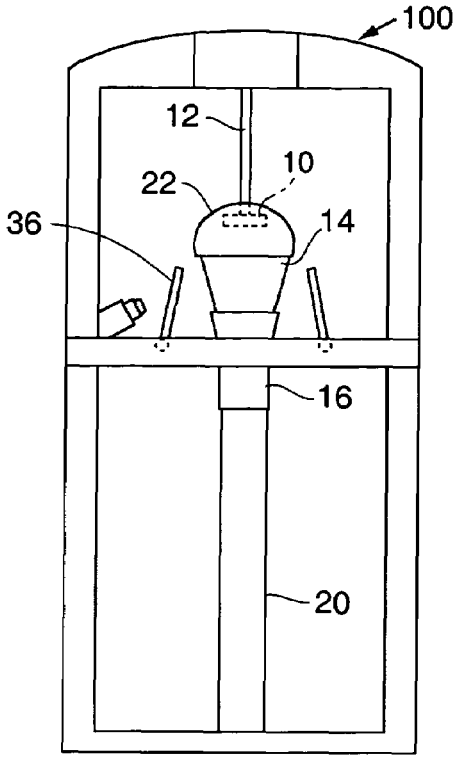

FIG. 5

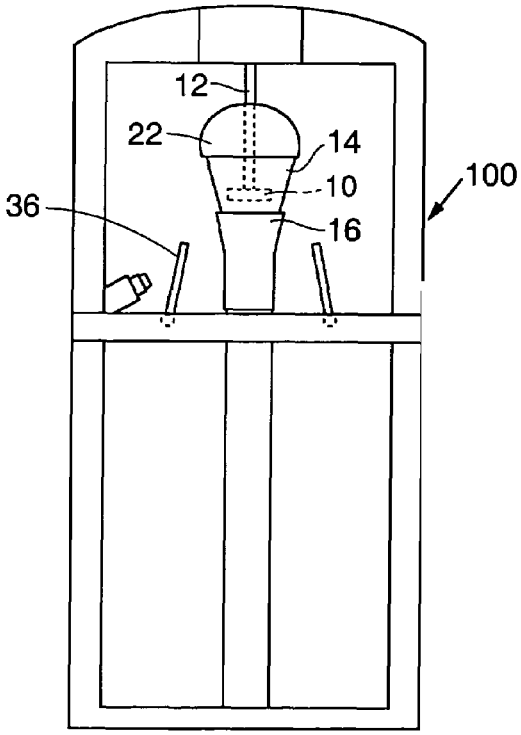

FIG. 6

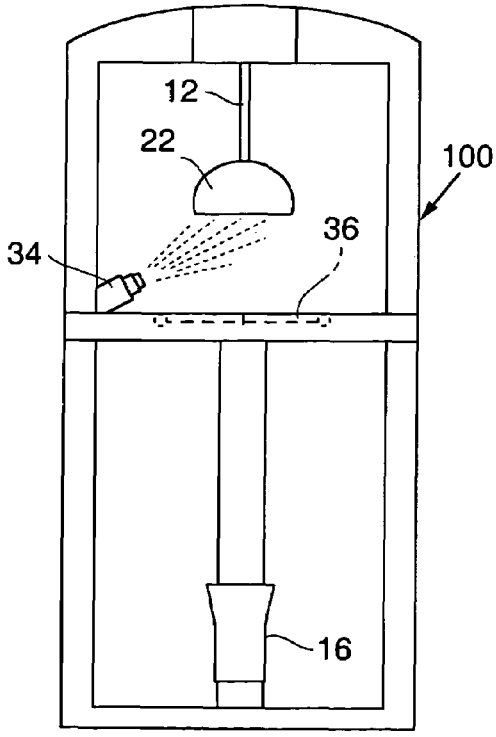

FIG. 7

RINSEABLE SPLASH SHIELD AND METHOD OF USE

PRIORITY

This application is a continuation-in-part of U.S. application Ser. No. 10/715,171, filed Nov. 17, 2003 now U.S. Pat. No. 7,144,150, which claims the benefit of Provisional Application No. 60/426,622, filed Nov. 15, 2002.

FIELD OF THE INVENTION

The present invention relates generally to the field of machines for mixing liquids, and specifically to devices for preventing splashing of liquids during mixing.

BACKGROUND OF THE INVENTION

Preparation of certain foods and beverages can involve blending, whipping, stirring, etc., the food or beverage. This may be done using a rotary blade or mixer which is lowered into a container holding the food or beverage, or which is held in place as the container is advanced towards the rotary blade/mixer to move the container's contents into contact with the blade/mixer.

In Applicant's U.S. Pat. Nos. 6,474,862, 6,326,047 and 5,803,377, entitled APPARATUS AND METHOD FOR MAKING FROZEN DRINKS, the disclosures of which are incorporated herein by reference, methods for making frozen drinks are described. These patents describe a machine that allows a milkshake or other frozen drink to be quickly made from a block of ingredients pre-frozen into a serving cup. The frozen contents within the serving cup are broken into small frozen particles using a rotating blade, and blended with an added liquid also using the rotating blade.

According to the patents, when a milkshake or other frozen drink is to be made, a serving cup containing the frozen block is positioned in a cup holder which forms a part of the frozen drink machine. A rotating blade is lowered into the cup and bores through the frozen substance in the cup, grinding it into small frozen particles. As the blade moves towards the bottom interior of the cup, milk, water, or another liquid is added to the cup and is blended into the frozen substance by the rotating blade. Alternatively, the rotating blade may be held at a fixed elevation, and the cup may be advanced towards the blade to move the cup's contents into contact with the blade. In either case, the cup and/or blade may be reciprocated to allow the full contents of the cup to be mixed.

During mixing, material can splash from the cup onto the drink machine and surrounding area. U.S. Pat. Nos. 5,328,263 and 5,439,289 (Neilson) each describe a separate, dedicated lid placement mechanism that positions a lid onto a cup so as to minimize such splashing when the contents of the cup are being mixed. U.S. Pat. No. 5,145,250 (Planck) describes a mixing device wherein a lid and mixing device move axially together until the lid makes contact with the receptacle, at which time springs keep the lid in contact with the receptacle as the mixing head travels further into the receptacle. In each case, there is potential for carryover of mixed ingredients from one batch to the next. In Planck, a disposable cover over the pressure plate of the lid is described. In Neilson U.S. Pat. No. 5,439,289 a provision for a releasable lid connector means is claimed to enable cleaning of the lid remotely from the mixing device. It is further desirable, however, to provide a drink mixer having a splash shield that may be automatically rinsed following mixing of each batch or beverage, preferably without disassembly or removal of any components or disposable covers.

SUMMARY OF THE INVENTION

The present application describes a method for rinsing a splash shield According to the disclosed method, a vessel containing contents to be mixed is positioned in a mixing machine, and a splash shield is positioned to shield the opening of the vessel during mixing. After the material within the vessel is mixed by a mixing element, the splash shield is separated from the vessel by the mixing machine and rinsed by a nozzle(s) on the mixing machine.

In another embodiment, a vessel containing contents to be mixed is positioned in a holder on a mixing machine, and a splash shield (which may or may not be rinseable) is positioned to shield the opening of the vessel. The contents of the vessel are mixed using a mixing element. During and/or after mixing, opposed relative movement of the mixing element and vessel may occur, creating an upward lifting force on the vessel that may cause it to lift out of the holder. The weight of the shield is sufficient to overcome this upward lifting force on the vessel and thereby causes the vessel to remain seated in the holder.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1**A is a top perspective view of a drink machine having a rinseable splash shield.

FIG. **1**B is a perspective view showing the enclosure of the drink machine of FIG. **1**A with the access door removed and with the hinged doors in the closed position. A portion of the structure supporting the hinged doors is cut away for clarity.

FIG. **2**A is a bottom perspective view showing a splash shield, shaft and mixing blade of FIG. **1**A, with the splash shield displaced from the mixing blade. For clarity, the portion of the shaft passing through the splash shield is not shown.

FIG. **2**B is a top perspective view of the components shown in FIG. **1**A.

FIG. **2**C is a top perspective view of the shaft engaged with the splash shield.

FIG. **3** is a top perspective view similar to FIG. **2**B showing an alternative splash shield.

FIGS. **4** through **7** are a sequence of front elevation views of the drink machine of FIG. **1** illustrating use of the rinseable splash shield.

DETAILED DESCRIPTION OF THE DRAWINGS

Referring to FIG. **1**, the splash shield disclosed in this application is preferably provided as a component of a mixing/blending machine **100** that uses a rotating blade to mix/blend the contents within a cup or other vessel. Machine **100** may be a machine such as the f'REAL! Self-Serve Milkshake Blender available from f'REAL! Foods LLC, 37 Avenida de Orinda, Orinda, Calif., which is particularly useful for mixing/blending drinks such as frozen milkshakes, coffee drinks, or smoothies. However, it should be appreciated that the rinseable shield may be suitable for use on other types of machines for mixing and/or blending various materials, including powders, slurries and other types of liquids.

Machine **100** includes a mixing blade **10** carried on an elongate shaft **12**. Mixing blade **10** is rotatable by means of a motor (not shown) and is designed to bore through the frozen substance in a cup **14**. As described in greater detail in Applicants U.S. Pat. Nos. 6,474,862, 6,326,047 and 5,803,377, cup **14** is preferably a serving cup within which milkshake or other frozen drink ingredients have been pre-frozen into a block. A cup holder **16** supports the cup and is preferably

moveable as indicated by arrow A1 in FIG. **1**, to cause the mixing blade to blend the frozen drink in the cup. Although movement of the holder **16** can be achieved in various ways, in the FIG. **1** embodiment the cup holder **16** is mounted to a carriage **18** that is moveable along a vertical rail **20** by means of a motor and lead screw assembly (not shown) disposed within the machine **100**. Mixing blade **10** is rotatable by means of a motor (not shown) and is designed to bore through the frozen substance in the cup. As described in Applicant's prior patents, water, milk or another liquid is added to the cup for blending with the frozen substance, which is broken up into small frozen particles by the boring blade **10**. The added liquid may be directed into the cup from above, such as through a fluid outlet **19** (FIG. **1**B) oriented adjacent to the shaft.

As discussed, during mixing, the cup **14** is preferably reciprocated by cup holder **16** as indicated by arrow A1 in FIG. **1**A, to cause the rotating blade **10** to pass through the contents of the cup one or more times. Obviously, the blade **10** may include a second motor for moving the shaft **12** longitudinally, in which case the need for the motor associated with cup holder **16** would be eliminated.

Referring to FIGS. **2**A and **2**B, splash shield **22** is preferably proportioned to seat along the upper edge of cup **14**. The shield includes an upper opening **24** and a larger lower opening **26**. Shaft **12** extends through the openings **24**, **26** such that the mixing blade **10** is positioned beneath the shield **22**. Opening **24** is preferably proportioned such that ingredients (e.g. milk, water, heated water, or other liquid) can be directed from fluid outlet **19** (FIG. **1**B) into the cup **14** via opening **24**, but also to minimize splashing of material through this opening in the shield. If desired, a separate opening for receiving ingredients may be used instead of, or in addition to, opening **24**.

Shaft **12** includes an outwardly tapered portion **32**, such that the tapered portion **32** engages the circumference of the opening **24** (see FIG. **2**C) when the shield is lowered relative to the shaft. When the shield is raised relative to the shaft, the shield **22** and tapered portion **32** separate as in FIGS. **2**A and **2**B. Alternatively, spaced apart ribs **30** (FIG. **3**) may be optionally positioned along the wall **28** to contact the tapered portion **32** of the machine's mixing shaft (as shown in FIG. **1**) when the shield **22** is lowered relative to the shaft.

Shield **22** may have a dome-shaped configuration as shown, although other configurations would be equally suitable. As shown in FIG. **2**B, a wall **28** tapers inwardly from the uppermost surface of the shield **22** down to the upper opening **24**. Wall **28** helps to funnel added water or other ingredients down towards opening **24** and can help to prevent spillage of the ingredients when the stream of ingredients to be added is offset from the opening **24**. The wall **28** is preferably smooth and free of surface features which might encourage accumulation of splattered milkshake material or which might interfere with cleaning of the wall. A similar wall **28***a* is shown in the alternative embodiment of FIG. **3**.

The shield may be weighted as described in greater detail in the "Operation" section below. Additionally, the shield is preferably shaped such that when it is suspended from the shaft **12**, its center of gravity is below the area of contact between the shaft and the shield. This helps to avoid tipping of the shield to one side relative to the shaft, keeping it aligned with the shaft and upper edge of cup **14**.

Referring again to FIGS. **1**A and **1**B, one or more nozzles **34***a*, **34***b* (only one is shown in FIG. **1**A) are provided for directing rinsing fluid into the interior of shield **22**. For example, nozzle **34***b* may be oriented to direct rinse fluid downwardly towards wall **28** and opening **24**, and a second nozzle **34***a* may be oriented to direct rinse fluid upwardly into contact with the underside of the shield. Nozzles **34***a*, **34***b* are coupled to one or more sources of rinse fluid, such as water (preferably hot or warm water) and/or sanitizing solution such as a quaternary ammonium sanitizer solution. Providing rinse fluid that is warm or hot (e.g. having a temperature in the range of 100 F to 180 F) can significantly accelerate the killing of bacteria by the sanitizing solution or other rinse fluid.

Machine **100** includes a pair of automatic hinged doors **36** along the path of travel of holder **16**. A fluid trough **38** for receiving rinse water shed from the shield surrounds the hinged doors. A drain line (not shown) is fluidly coupled to the trough, and the trough includes gradients arranged to direct water towards the drain line. As can be seen in FIGS. **1**A and **1**B, when the doors **36** are closed they are positioned at a sloped angle, thus allowing rinse water flowing from the shield to flow onto one of the doors and then flow down the slope of the door and into the trough. The trough **38**, rinse nozzle **34**, shaft **12**, shield **22** and mixing element are preferably positioned within an enclosure **40** having an access door **42** (as shown in FIG. **1**).

A controller (not shown) within the machine controls operation of the motors for the cup holder, blade and hinged doors, as well as the liquid dispense and rinsing functions.

OPERATION

FIGS. **4**-**7** are a sequence of drawings that illustrate operation of the rinseable splash shield, which in its preferred form may be rinsed without disassembly or removal of any components or disposable covers. First, a cup **14** containing frozen ingredients is positioned in cup holder **16** as shown in FIG. **4** and the user depresses a "start" button (not shown) on the exterior of the machine **100**. Next (FIG. **5**), hinged doors **36** are opened and holder **16** is moved upwardly along rail **20**, thereby moving the upper edge of cup **14** into contact with the shield **22**. Continued upward movement of the holder **16** causes the shield **22** to be raised upwardly on the shaft, and the tapered section **32** of the shaft **12** to separate from the opening **24** (or ribs **30**) of the shield **22**, as the cup **14** moves up around the blade **10**, as shown in FIG. **6**. Rotation of the blade is activated (or may be activated at an earlier stage), and water, milk or other fluid may be directed into the cup as described in Applicant's earlier patents listed above, causing the frozen beverage to be made. The fluid may be introduced through the opening **24** in the shield. During mixing/blending the holder **16** (or the blade) may be reciprocated to allow the blade to pass through the full contents of the cup more than one time.

It should be noted that the shield **22** may be weighted to ensure a good seal with the cup. This eliminates the need for springs, as disclosed in Plank U.S. Pat. No. 5,145,250, or some other mechanism such as those described in Neilson U.S. Pat. Nos. 5,328,263 and 5,439,289, to hold the shield in position during mixing. Weighting the shield is of further advantage if it is heavy enough to create sufficient downward force on the cup to overcome any upward force created by the mixing blade being moved upwardly in the cup. The mixing blade can create such upward force as the mixing blade moves upwardly in the cup, imparting an upward force on the cup as a result of suction force or the viscous nature of the product being mixed in the cup. This can occur when the cup is lowered by the holder during mixing (i.e. when the cup is reciprocated to cause the mixing blade to pass through the cup's contents several times) and/or when the cup is lowered away from the blade after blending/mixing. Making the weight of the shield sufficient to overcome this upward lifting

force on the cup causes the cup to remain seated in the cup holder without any other mechanical means of retaining it in the cup holder, such as clamping or gripping mechanisms or the springs or lid placement and retention mechanisms previously described. In one embodiment, the shield may be cast stainless steel having a weight of approximately 5 lbs. It should be noted that a weighted splash shield may be provided even if the rinsing feature is not present.

Once the beverage is made, the cup holder **16** is lowered and thereby moves the cup **14** downwardly away from the blade. The descending cup carries the shield **22** downwardly until the opening **24** (or ribs **30**) of the shield engages tapered portion **32** of the shaft **12**. At this point, the cup **14** separates from the shield **22** and is moved by the holder **16** to the position shown in FIG. **4**. The cup may then be removed from the drink machine **100**.

Next, the hinged doors **36** are closed and rinse fluid is directed onto the shield **22** using nozzles **34***a*, **34***b* as shown in FIG. **7**. In the FIG. **1**B embodiment, nozzle **34***b* directs rinse fluid onto the upper portion of the shield **22**, and nozzle **34***a* directs fluid onto the underside of the shield **22**, the blade **10**, and the shaft **12**. If desired, the shaft **12** may be rotated during and after rinsing. Given the weight of the splash shield and the contact between ribs **30** and tapered section **32** on the shaft, rotating the shaft **12** rotates the splash shield as well. Rotation may be of particular advantage since rotation allows the full surface of the shield **22** to be exposed to the fluid spray from the nozzles even if the nozzles are located to one side of the shield. Rotation also allows rinse water to be spun off the shield by centrifugal force, which can be a particular advantage if the rinse water contains sanitizing solution as this rotation minimizes clinging of the rinse water to the shield and associated transfer of sanitizing solution into subsequent drinks mixed by the drink machine. The shield, blade and closed doors **36** shed the rinse fluid into trough **38**, which then directs the water out of the machine via the drain line.

I claim:

1. A method for rinsing a splash shield on a mixing machine, the method comprising the steps of:

providing a vessel containing material to be mixed, the vessel including an opening;

further providing a mixing machine having a holder for receiving the vessel at an access location in the mixing machine, a rotatable mixing element extendable into the vessel for mixing the material, a splash shield positionable to shield the opening of the vessel, and a nozzle oriented towards the splash shield;

after mixing the material in the vessel using the mixing element and with the splash shield shielding the vessel opening, unshielding the vessel opening and directing hot rinsing fluid onto the splash shield using the nozzle while isolating the access location from the rinsing fluid.

2. The method of claim **1**, wherein the directing step is performed automatically after the separating step.

3. The method of claim **1**, wherein the holder is moveable in a first direction towards the splash shield and a second direction away from the splash shield and wherein the unshielding step includes the step of moving the holder in the second direction.

4. The method of claim **3**, wherein:

the mixing element is on a shaft;

the splash shield is engageable with a portion of the shaft, the splash shield disengageable from that portion of the shaft in response to upward force against the shield, and

mixing is carried out with the splash shield disengaged from that portion of the shaft;

the step of moving the holder in the second direction separates the vessel and splash shield and causes the splash shield to engage with the portion of the shaft; and

the method further includes the step of rotating the shaft to rotate the splash shield during the directing step.

5. The method of claim **1**, further including the step of rotating the splash shield during the directing step.

6. The method of claim **1**, wherein the directing step directs warm rinse fluid.

7. The method of claim **1**, further including the step of directing rinsing fluid onto the mixing element.

8. The method of claim **1**, wherein the method includes the steps of:

with the mixing element in the material in the vessel, causing relative movement of the mixing element and vessel in opposite directions, and

causing the splash shield to retain the vessel within the holder during relative movement of the mixing element and vessel in opposite directions.

9. The method of claim **8**, wherein in the causing step the mass of the splash shield retains the vessel within the holder.

10. The method of claim **1**, wherein the directing step directs a rinse solution comprising sanitizing solution.

11. The method of claim **10**, wherein the sanitizing solution includes a quaternary ammonium sanitizer solution.

12. The method of claim **10**, wherein the sanitizing solution is a heated sanitizing solution.

13. The method of claim **1**, wherein the providing step provides an upwardly directed first nozzle and a downwardly directed second nozzle, and wherein the directing step directs fluid from the first and second nozzles.

14. The method of claim **1**, wherein the providing step provides the splash shield to be positionable in contact with the vessel and covering the opening, and wherein the unshielding step includes separating the splash shield and the vessel.

15. The method of claim **1**, wherein the providing step provides the mixing machine to include a chamber, and wherein the directing step includes isolating the splash shield within the chamber.

16. The method according to claim **1**, wherein the providing step provides a barrier moveable into a position between the chamber and the access area, and wherein the isolating step includes moving the barrier to the position.

17. The method of claim **16**, wherein the barrier includes a door moveable into a closed position covering the chamber, and wherein the isolating step includes moving the door to the closed position.

18. The method of claim **17**, wherein the door is positioned at a sloped angle, and wherein the directing step includes allowing rinse fluid flowing off of the splash shield to contact the door and then flow down the slope and off the door into a receiving channel and into a drain.

19. The method of claim **18** wherein the holder is moveable between a first position in which the opening of vessel is external to the chamber and a second position in which the opening of the vessel is within the chamber, and wherein the isolating step includes moving the holder from the second position to the first position and positioning the barrier between the holder in the first position and the chamber.

20. The method of claim **17**, wherein the isolating step further includes moving the holder in a direction away from the chamber.

21. A method for rinsing a splash shield on a mixing machine, the method comprising the steps of:

providing a vessel containing material to be mixed, the vessel including an opening;

further providing a mixing machine having a holder for receiving the vessel, a rotatable mixing element extendable into the vessel for mixing the material, a splash shield positionable to shield the opening of the vessel, and a nozzle oriented towards the splash shield;

after mixing the material in the vessel using the mixing element and with the splash shield shielding the vessel opening, unshielding the vessel opening and directing rinsing fluid onto the splash shield using the nozzle while isolating the vessel from the rinsing fluid.

22. The method of claim **21**, wherein the isolating step isolates the holder from the rinsing fluid.

* * * * *

EXHIBIT 5

Hershey's

f'real

Hershey's

f'real

EXHIBIT 6

fREAL FOODS, LLC PATENT ASSIGNMENT

WHEREAS, fREAL FOODS, LLC, a California Limited Liability Company, having a place of business at 37 Avenida de Orinda, Orinda, California 94563 (hereinafter "Assignor"), is the owner of the entire worldwide right, title and interest in and to the patents, patent applications, and the inventions described or claimed therein, identified in the attached Schedule A (hereinafter "said Patents");

WHEREAS, Rich Products Corporation, a New York corporation, having a place of business at One Robert Rich Way, Buffalo, New York 14213 (hereinafter "Assignee") is desirous of acquiring the entire worldwide right, title and interest in and to said Patents;

NOW THEREFORE, for good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, Assignor does hereby sell, transfer, assign, convey and grant to Assignee, its successors and assigns the entire worldwide right, title and interest in and to said Patents and any continuation, division, continuation-in-part, renewal, substitute or reissue thereof for the full term or terms which the claims are or may be granted, including the subject matter of any and all claims which have been or may be obtained in said Patents, the right, where such right can be legally exercised, in Assignee's own name to apply for and obtain patents in countries foreign to the United States, including the full right to claim for any such application the benefits of the International Convention and the Patent Cooperation Treaty as fully and entirely as Assignor could have done if the foreign application had been filed in the names of the Assignor or Applicant, and the entire interest in any Letters Patent which may be granted on any such application in such foreign countries, and the right to make claim for and obtain all

damages by reason of infringement of said Patents, including past infringement prior to Assignee's acquisition of these rights, together with the right to sue for, in Assignee's own name, and collect damages for Assignee's own use and enjoyment and for the use and enjoyment of its successors, assigns or other legal representatives;

Assignor authorizes and requests the United States Commissioner of Patents and Trademarks to issue all letters patents which may issue on said invention included in the subject matter of said Patents to Assignee, its successor and assigns, and any official of any country or countries foreign to the United States whose duty it is to issue patents on applications as aforesaid, to issue said Patents to Assignee, its successors and assigns, as the Assignee has the entire right, title and interest in and to the same, for the sole use and enjoyment of said Assignee, its successors and Assigns.

IN WITNESS WHEREOF, Assignor and Assignee have herein caused these present to be executed by a duly authorized corporate officer.

fREAL FOODS, LLC

By: _____

Name: James Farrell

Title: President

STATE OF :)
) SS
COUNTY OF :)

Subscribed and sworn to before me this 11th day of December, 2012.

AMY P. HERSTEK
NOTARY PUBLIC-STATE OF NEW YORK
No. 02HE6171017
Qualified in Erie County
My Commission Expires July 23, 20___

_____
Notary Public

RICH PRODUCTS CORPORATION

By: Kevin Malchoff

Name: Kevin Malchoff

Title: Executive Vice President

STATE OF : New York)
) SS
COUNTY OF : Erie)

Subscribed and sworn to before me this 11th day of December, 2012.

Sharon E Palisano
Notary Public

SHARON E. PALISANO
Notary Public, State of New York
Qualified in Niagara County
My Commission Expires April 16, 2014

SCHEDULE A

	COUNTRY	INVENTION TITLE	SER. NO./ PAT. NO.	FILING/ ISSUE DATE
1	U.S.	Apparatus and Method for Making Frozen Drinks	5,803,377	8 Sep 1998
2	U.S.	Method for Making Frozen Drinks	5,962,060	5 Oct 1999
3	U.S.	Cup with Anti-Rotation Mechanism	6,041,961	28 Mar 2000
4	U.S.	Apparatus and Method for Making Frozen Drinks	6,326,047	4 Dec 2001
5	U.S.	Method for Making Frozen Drinks	6,465,034	15 Oct 2002
6	U.S.	Apparatus for Making Frozen Drinks	6,474,862	5 Nov 2002
7	U.S.	Cutting Device and Method for Cutting Material from a Container	6,527,207	4 Mar 2003
8	U.S.	Rinseable Splash Shield and Method of Use	7,144,150	5 Dec 2006
9	U.S.	Rinseable Splash Shield and Method of Use	7,520,662	21 Apr 2009
10	U.S.	Rinseable Splash Shield and Method of Use	7,520,658	21 Apr 2009
11	JAPAN	Cutting Device and Method for Cutting Material from a Container	45,000,442	23 Apr 2010
12	U.S.	Three Ribbed Cup	12/265,397	5 Nov 2008
13	U.S.	Commercial Frozen Food Preparation Apparatus	12/902,252	12 Oct 2010
14	U.S.	Commercial Frozen Food Preparation Apparatus Sanitation	12/902,277	12 Oct 2010
15	U.S.	Commercial Frozen Food Preparation Apparatus Electronics	12/902,283	12 Oct 2010
16	U.S.	Rotational Restraint Methodology in a Frozen Mixing System and Container	13/159,322	12 Oct 2010
17	U.S.	Frozen Mixing System and Container Restraint	13/159,325	13 Jun 2011
18	U.S.	Compact Blender for Frozen Beverages	13/533,922	13 Jun 2011
19	U.S.	Removable Blender Spindle with Container Cover	13/533,928	26 Jun 2012
20	U.S.	Method for Blending Food or Beverage	13/533,938	26 Jun 2012
21	U.S.	Removable Cupholder for Compact Blender	13/533,950	26 Jun 2012

	COUNTRY	INVENTION TITLE	SER. NO./ PAT. NO.	FILING/ ISSUE DATE
22	PCT	**Commercial Frozen Food Preparation Apparatus**	**PCT/US10/52234**	**12 Oct 2010**
23	EP	**Commercial Frozen Food Preparation Apparatus**	**2010823913**	**12 Oct 2010**
24	CA	**Commercial Frozen Food Preparation Apparatus**	**2770358**	**12 Oct 2010**
25	AU	**Commercial Frozen Food Preparation Apparatus**	**2010307039**	**12 Oct 2010**
26	PCT	**Commercial Frozen Food Preparation Apparatus Sanitation**	**PCT/US10/52240**	**12 Oct 2010**
27	AU	**Commercial Frozen Food Preparation Apparatus Sanitation**	**2010307041**	**12 Oct 2010**
28	EP	**Commercial Frozen Food Preparation Apparatus Sanitation**	**2010823914**	**12 Oct 2010**
29	CA	**Commercial Frozen Food Preparation Apparatus Sanitation**	**2770364**	**12 Oct 2010**
30	PCT	**Commercial Frozen Food Preparation Apparatus Electronics**	**PCT/US10/52241**	**12 Oct 2010**
31	EP	**Commercial Frozen Food Preparation Apparatus Electronics**	**2010823915**	**12 Oct 2010**
32	CA	**Commercial Frozen Food Preparation Apparatus Electronics**	**2770371**	**12 Oct 2010**
33	AU	**Commercial Frozen Food Preparation Apparatus Electronics**	**2010307042**	**12 Oct 2010**
34	PCT	**Method and Apparatus for Rotationally Restraining a Mixing Container**	**PCT/US09/63171**	**3 Nov 2009**
35	EP	**Method and Apparatus for Rotationally Restraining a Mixing Container**	**09825314.9**	**3 Nov 2009**
36	CA	**Method and Apparatus for Rotationally Restraining a Mixing Container**	**2736153**	**3 Nov 2009**

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EXHIBIT 7

RICH PRODUCTS CORPORATION PATENT ASSIGNMENT

WHEREAS, RICH PRODUCTS CORPORATION, a Delaware corporation, having a place of business at One Robert Rich Way, Buffalo, New York 14213 (hereinafter "Assignor") is the owner of the entire worldwide right, title and interest in and to the patents, patent applications, and the inventions described or claimed therein, indicated in the attached Schedule A (hereinafter "said Patents");

WHEREAS, f'REAL FOODS, LLC, a California Limited Liability Company, having a place of business previously located at 37 Avenida de Orinda, Orinda, California 94563, but now located at 6121 Hollis Street, Suite 500, Emeryville, California 94608 (hereinafter "Assignee") is desirous of acquiring the entire worldwide right, title and interest in and to said Patents;

NOW THEREFORE, for good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, Assignor does hereby sell, transfer, assign, convey and grant to Assignee, its successors and assigns the entire worldwide right, title and interest in and to said Patents and any continuation, division, continuation-in-part, renewal, substitute or reissue thereof for the full term or terms which the claims are or may be granted, including the subject matter of any and all claims which have been or may be obtained in said Patents, the right, where such right can be legally exercised, in Assignee's own name to apply for and obtain patents in countries foreign to the United States, including the full right to claim for any such application the benefits of the International Convention and the Patent Cooperation Treaty as fully and entirely as Assignor could have done if the foreign application had been filed in the names of the Assignor or Applicant, and the entire interest in any Letters Patent which may be granted on any such application in such foreign countries, and the right to make claim for and obtain all damages by reason of infringement of said Patents, including past infringements prior to Assignee's acquisition of these rights, together with the right to sue for, in Assignee's own name, and collect

damages for Assignee's own use and enjoyment and for the use and enjoyment of its successors, assigns or other legal representatives;

Assignor authorizes and requests the United States Commissioner of Patents and Trademarks to issue all letters patents which may issue on said invention included in the subject matter of said Patents to Assignee, its successor and assigns, and any official of any country or countries foreign to the United States whose duty it is to issue patents on applications as aforesaid, to issue said Patents to Assignee, its successors and assigns, as the Assignee has the entire right, title and interest in and to the same for the sole use and enjoyment of said Assignee, its successors and Assigns.

IN WITNESS WHEREOF, Assignor and Assignee have herein caused these presents to be executed by a duly authorized corporate officer.

RICH PRODUCTS CORPORATION

By: Jill K Bond

Name: Jill K Bond

Title: SVP | General Counsel

STATE OF : New York)
) SS
COUNTY OF : Erie)

Subscribed and sworn to before me this 25th day of January, 2016.

Jenna E Labarbera
Notary Public

JENNA E. LABARBERA
NOTARY PUBLIC-STATE OF NEW YORK
Qualified In Genesee County
My Commission Expires August 09, 2018

IN WITNESS WHEREOF, Assignor and Assignee have herein caused these presents to be executed by a duly authorized corporate officer.

FREAL FOODS, LLC

By: _____

Name: Dinsh Guzdar

Title: Chief Executive Officer

STATE OF : California)
) SS
COUNTY OF : Alameda)

Subscribed and sworn to before me this _____ day of _____, 2016.

_____
Notary Public

PLEASE SEE ATTACHED NOTARY CERTIFICATE

California Jurat Certificate

A notary public or other officer completing this certificate verifies only the identity of the individual who signed the document to which this certificate is attached, and not the truthfulness, accuracy, or validity of that document.

State of California

County of Alameda } s.s.

Subscribed and sworn to (or affirmed) before me on this 25 day of Jan (Month), 2016, by Dinshaw Guzdar (Name of Signer (1)) and _____ (Name of Signer (2)), proved to me on the basis of satisfactory evidence to be the person(s) who appeared before me.

Amanpreet Kaur
Signature of Notary Public

AMANPREET KAUR
COMM. #2058824
NOTARY PUBLIC • CALIFORNIA
ALAMEDA COUNTY
Commission Expires Feb 22, 2018

Seal

For other required information (Notary Name, Commission No. etc.)

OPTIONAL INFORMATION

Although the information in this section is not required by law, it could prevent fraudulent removal and reattachment of this jurat to an unauthorized document and may prove useful to persons relying on the attached document.

Description of Attached Document Assignment

The certificate is attached to a document titled/for the purpose of

containing _____ pages, and dated _____

Additional Information

Method of Affiant Identification

Proved to me on the basis of satisfactory evidence:
○ form(s) of identification ○ credible witness(es)

Notarial event is detailed in notary journal on:

Page # _____ Entry # _____

Notary contact: _____

Other

☐ Affiant(s) Thumbprint(s) ☐ Describe: _____

SCHEDULE A

	COUNTRY	INVENTION TITLE	SER. NO./ PAT. NO.	FILING/ ISSUE DATE
1	U.S.	Apparatus and Method for Making Frozen Drinks	5,803,377	8 Sep 1998
2	U.S.	Method for Making Frozen Drinks	5,962,060	5 Oct 1999
3	U.S.	Cup with Anti-Rotation Mechanism	6,041,961	28 Mar 2000
4	U.S.	Apparatus and Method for Making Frozen Drinks	6,326,047	4 Dec 2001
5	U.S.	Method for Making Frozen Drinks	6,465,034	15 Oct 2002
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